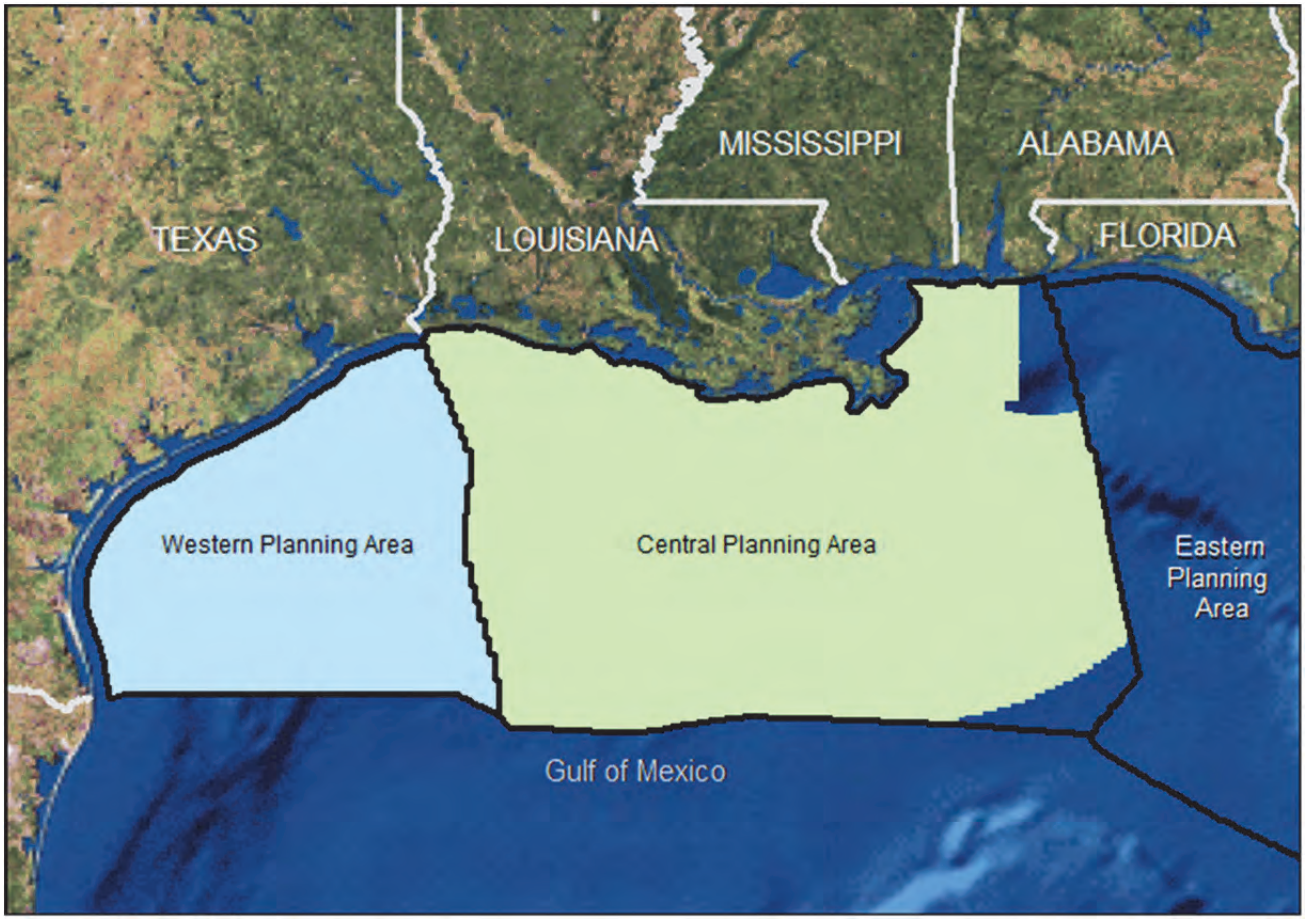
OCS EIS/EA
BOEM 2013-0118

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



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

BOEM
Bureau of Ocean Energy Management

OCS EIS/EA
BOEM 2013-0118

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

Author

Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

Published by

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

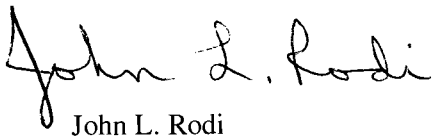
New Orleans
April 2013

REGIONAL DIRECTOR'S NOTE

This Supplemental Environmental Impact Statement (EIS) addresses two proposed Gulf of Mexico Outer Continental Shelf (OCS) oil and gas lease sales: Western Planning Area (WPA) Lease Sale 233 and Central Planning Area (CPA) Lease Sale 231, 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 EIS 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).

The 2012-2017 WPA/CPA Multisale EIS analyzed the potential impacts of the proposed actions on the marine, coastal, and human environments. It is important to note that the 2012-2017 WPA/CPA Multisale EIS was prepared using the best information that was publicly available at the time the document was prepared. This Supplemental EIS is deemed appropriate to supplement the document cited above for proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231 in order to consider new circumstances and information arising from, among other things, the *Deepwater Horizon* explosion, oil spill, and cleanup. This Supplemental EIS's analysis focuses on updating the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the WPA and CPA since publication of the 2012-2017 WPA/CPA Multisale EIS. 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 WPA Lease Sale 233 and proposed CPA Lease Sale 231.

The Bureau of Ocean Energy Management'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 in 1969. We have prepared and published more than 50 draft and 50 final EIS's. 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 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.



John L. Rodi
Regional Director
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region

COVER SHEET

Supplemental Environmental Impact Statement
for
Proposed Western Planning Area OCS Oil and Gas Lease Sale 233
and
Proposed Central Planning Area OCS Oil and Gas Lease Sale 231

Draft ( ) Final (x)

Type of Action: Administrative (x) Legislative ( )

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

Agency	Headquarters Contact	Region Contact
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	Poojan Tripathi (HM 3107) U.S. Department of the Interior Bureau of Ocean Energy Management 381 Elden Street Herndon, VA 20170-4817 (703) 787-1738	Casey Rowe (504) 736-2781 Gary D. Goeke (504) 736-3233

ABSTRACT

This Supplemental Environmental Impact Statement (EIS) addresses two proposed Gulf of Mexico Outer Continental Shelf (OCS) oil and gas lease sales: Western Planning Area (WPA) Lease Sale 233 and Central Planning Area (CPA) Lease Sale 231, 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 WPA and CPA since publication of *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 analyzes the potential impacts of the WPA and CPA proposed actions 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 actions are considered to be major Federal actions requiring an EIS. This document provides the following information in accordance with the National Environmental Policy Act and its implementing regulations, and it will be used in making decisions on the proposals. This document includes the purpose and background of the proposed actions, identification of the alternatives, description of the affected environment, and an analysis of the potential environmental impacts of the proposed actions, alternatives, and associated activities, including proposed mitigating measures and their potential effects. Potential contributions to cumulative impacts resulting from activities associated with the proposed actions 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 proposed actions are adopted. Activities and disturbances associated with the proposed actions on biological, physical, and socioeconomic resources are considered in the analyses.

Additional copies of this Supplemental EIS, the 2012-2017 WPA/CPA Multisale EIS, and the other referenced publications may be obtained from the Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, Public Information Office (GM 217G), 1201 Elmwood Park Boulevard, New Orleans, Louisiana 70123-2394, by telephone at 504-736-2519 or 1-800-200-GULF, or on the Internet at http://boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/nepaprocess.aspx.

SUMMARY

This Supplemental Environmental Impact Statement (EIS) addresses two proposed Federal actions: one oil and gas lease sale in the Western Planning Area (WPA) and one oil and gas lease sale in the Central Planning Area (CPA) of the Gulf of Mexico Outer Continental Shelf (OCS), 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 WPA and CPA since publication of *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 analyzes the potential impacts of the WPA and CPA proposed actions 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 two proposed lease sales include WPA Lease Sale 233 and CPA Lease Sale 231. Federal regulations allow for several related or similar proposals or actions to be analyzed in one EIS or Supplemental EIS (40 CFR 1502.4). Since each lease sale proposal and projected activities are very similar for each proposed lease sale area, a single Supplemental EIS is being prepared for both proposed lease sales.

This summary section is only a brief overview of the proposed lease sales, 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 analyses. Relevant discussions can be found in the chapters of this Supplemental EIS as described below.

- **Chapter 1**, The Proposed Actions, describes the purpose of and need for the proposed lease sales, the prelease process, postlease activities, and other OCS-related activities.
- **Chapter 2**, Alternatives Including the Proposed Actions, describes the environmental and socioeconomic effects of the proposed lease sales and alternatives. Also discussed are potential mitigating measures to avoid or minimize impacts.
- **Chapter 3**, Impact-Producing Factors and Scenario, describes activities associated with the proposed lease sales 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 activities (impact-producing factors) associated with the proposed lease sales 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 the proposed lease sales.

  Chapter 3.3, Cumulative Activities Scenario, describes past, present, and reasonably foreseeable future human activities, including non-OCS activities,

as well as all OCS 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, accidental, and cumulative impacts of the proposed actions and the alternatives on environmental and socioeconomic resources of the Gulf of Mexico.

  Chapter 4.1, Proposed Western Planning Area Lease Sale 233, describes the impacts of the proposed action and two alternatives to the WPA proposed action on the biological, physical, and socioeconomic resources of the Gulf of Mexico.

  Chapter 4.2, Proposed Central Planning Area Lease Sale 231, describes the impacts of the 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 4.3**, Unavoidable Adverse Impacts of the Proposed Actions; **Chapter 4.4**, Irreversible and Irretrievable Commitment of Resources; and **Chapter 4.5**, 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.
- **Appendix A**, Air Quality Offshore Modeling Analysis, presents a detailed analysis of the Offshore Coastal Dispersion Model for air quality purposes.

Proposed Action and Alternatives

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

Alternatives for Proposed Western Planning Area Lease Sale 233

Alternative A—The Proposed Action: This is the Bureau of Ocean Energy Management's (BOEM's) preferred alternative. This alternative would offer for lease all unleased blocks within the proposed WPA lease sale area (**Figure 2-1**), with the following exception:

(1) whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary (i.e., the boundary as of the publication of this Supplemental EIS).

Alternative A of the 2012-2017 WPA/CPA Multisale EIS also included an exclusion of whole and partial blocks that lie within the 1.4-nautical mile (nmi) buffer zone north of the maritime boundary between the United States and Mexico. The U.S. and Mexico have been pursuing an Agreement to govern the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico. On February 20, 2012, the Agreement was signed by representatives of each Government, but it has not yet been enacted. Upon its enactment, the blocks and acreage in this buffer zone that were not offered in past lease sales will become available and will no longer need to be excluded.

Although the leasing of portions of the WPA and CPA (subareas or blocks) can be deferred during a Five-Year Program, the U.S. Department of the Interior (DOI) is conservative throughout the National Environmental Policy Act (NEPA) process and includes the total area within the Gulf of Mexico planning areas for environmental evaluation.

The proposed WPA lease sale area encompasses about 28.58 million ac. As of March 2013, approximately 20.7 million ac of the proposed WPA lease sale area are currently unleased. The estimated amount of resources projected to be developed as a result of proposed WPA Lease Sale 233 is 0.116-0.200 billion barrels of oil (BBO) and 0.538-0.938 trillion cubic feet (Tcf) of gas (Table 3-1 of the 2012-2017 WPA/CPA Multisale EIS).

Alternative B—The Proposed Action Excluding the Unleased Blocks Near Biologically Sensitive Topographic Features: This alternative would offer for lease all unleased blocks within the proposed WPA lease sale area, as described for the proposed action (Alternative A), with the exception of any unleased blocks subject to the Topographic Features Stipulation.

Alternative C—No Action: This alternative is the cancellation of proposed WPA Lease Sale 233. If this alternative is chosen, the opportunity for development of the estimated 0.116-0.200 BBO and 0.538-0.938 Tcf of gas that could have resulted from proposed WPA Lease Sale 233 would be precluded or postponed to a future WPA lease sale. Any potential environmental impacts resulting from proposed WPA Lease Sale 233 would not occur or would be postponed to a future lease sale decision. This is also analyzed in the EIS for the Five-Year Program on a nationwide programmatic level.

Alternatives for Proposed Central Planning Area Lease Sale 231

Alternative A—The Proposed Action: This is BOEM's preferred alternative. This alternative would offer for lease all unleased blocks within the proposed CPA lease sale area (**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.

Alternative A of the 2012-2017 WPA/CPA Multisale EIS also included an exclusion of whole and partial blocks that lie within the 1.4-nmi buffer zone north of the maritime boundary between the United States and Mexico. The U.S. and Mexico have been pursuing an Agreement to govern the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico. On February 20, 2012, the Agreement was signed by representatives of each Government, but it has not yet been enacted. Upon its enactment, the blocks and acreage in this buffer zone that were not offered in past lease sales will become available and will no longer need to be excluded.

Although the leasing of portions of the CPA and WPA (subareas or blocks) can be deferred during a Five-Year Program, DOI is conservative throughout the NEPA process and includes the total area within the Gulf of Mexico planning areas for environmental evaluation.

The proposed CPA lease sale area encompasses about 63 million ac of the CPA's 66.45 million ac. As of March 2013, approximately 43.0 million ac of the proposed CPA lease sale area are currently unleased. The estimated amount of resources projected to be developed as a result of proposed CPA Lease Sale 231 is 0.460-0.894 BBO and 1.939-3.903 Tcf of gas (Table 3-1 of the 2012-2017 WPA/CPA Multisale EIS).

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), with the exception of any unleased blocks subject to the Topographic Features Stipulation.

Alternative C—No Action: This alternative is the cancellation of proposed CPA Lease Sale 231. 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 proposed CPA Lease Sale 231 would be precluded or postponed to a future WPA lease sale. Any potential environmental impacts resulting from proposed

CPA Lease Sale 231 would not occur or would be postponed to a future lease sale decision. This is also analyzed in the EIS for the Five-Year Program on a nationwide programmatic level.

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. Five lease stipulations are proposed for proposed WPA Lease Sale 233—the Topographic Features Stipulation, the Military Areas Stipulation, the Protected Species Stipulation, the Law of the Sea Convention Royalty Payment Stipulation, and the Transboundary Stipulation. Ten lease stipulations are proposed for proposed CPA Lease Sale 231—the Topographic Features Stipulation; the Live Bottom Stipulation; the Military Areas Stipulation; the Evacuation Stipulation; the Coordination Stipulation; the Blocks South of Baldwin County, Alabama, Stipulation; the Protected Species Stipulation; the Law of the Sea Convention Royalty Payment Stipulation; the Below Seabed Operations Stipulation; and the Transboundary Stipulation. The Law of the Sea Convention Royalty Payment Stipulation is applicable to proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231 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 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 sales, 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 stipulations or mitigation requirements to be included in a lease sale will be described in the Final Notice of Sale. Mitigation measures in the form of lease stipulations are added to the lease terms and are therefore enforceable as part of the lease.

Scenarios Analyzed

Offshore activities are described in the context of scenarios for a 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 a proposed 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 a 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 analysis (**Chapter 4**) considers environmental and socioeconomic impacts that may result from the incremental impact of the proposed actions when added to all past, present, and reasonably foreseeable future activities, including non-OCS 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.

Significant Issues

The major issues that frame the environmental analyses in this Supplemental EIS and the 2012-2017 WPA/CPA Multisale EIS are the result of concerns raised during years of scoping for the Gulf of Mexico OCS Program. Issues related to OCS 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, topographic

features, *Sargassum* communities, deepwater benthic communities, soft bottom benthic communities, marine mammals, sea turtles, diamondback terrapins, coastal and marine birds, fish resources and essential fish habitat, commercial fisheries, recreational fishing, recreational resources, archaeological resources, socioeconomic conditions, and within the CPA only, beach mice, live bottoms, and Gulf sturgeon.

Other relevant issues include impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup; from past and future hurricanes on environmental and socioeconomic resources; and on coastal and offshore infrastructure. During the past few years, the Gulf Coast States and Gulf of Mexico oil and gas activities have been impacted by major hurricanes. The description of the affected environment (**Chapters 4.1 and 4.2**) includes impacts from these storms on the physical environment, biological environment, and socioeconomic activities and OCS-related infrastructure. Baseline data are considered in the assessment of impacts from the proposed actions to the resources and the environment (**Chapters 4.1 and 4.2)**.

Impact Conclusions

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA and CPA proposed actions and the proposed actions' incremental contribution to the cumulative impacts are described in **Chapters 4.1 and 4.2**. A summary of the potential impacts from the WPA and CPA proposed actions 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 the WPA and CPA proposed actions are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, emission heights, emission rates, and the distance of these emissions from the coastline, and are expected to be well within the National Ambient Air Quality Standards. 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. These emissions from routine activities and accidental events associated with the WPA and CPA proposed actions 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 WPA and CPA proposed actions would be minimal if all existing regulatory requirements are met. 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.

Coastal Barrier Beaches and Associated Dunes: Routine activities associated with the WPA or CPA proposed action, such as increased vessel traffic, maintenance dredging of navigation canals, and pipeline installation, would cause negligible 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 onshore activities. The potential impacts from accidental events (primarily oil spills), associated with the WPA or CPA proposed action are anticipated to be minimal. Should a spill (other than a catastrophic spill) 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 WPA or CPA proposed action. The incremental contribution of the WPA or CPA proposed action to the cumulative impacts of coastal barriers and their associated dunes is expected to be small and localized. Compared with the historic and ongoing threats to coastal barrier beaches and dunes, such as development threats, natural factors such as hurricanes, and

channelization, any remaining effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on coastal barrier beaches and dunes are expected to be small in comparison.

Wetlands: Routine activities associated with the WPA or 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 mitigation measures that would be used to further reduce these impacts. Indirect impacts from wake erosion and saltwater intrusion are expected to result in low impacts that are indistinguishable from direct impacts from inshore activities. The potential impacts from accidental events (primarily oil spills, excepting catastrophic spills) are anticipated to be minimal. Overall, impacts to wetland habitats from an oil spill associated with activities related to the WPA or CPA proposed action would be expected to be small and temporary because of the nature of the system, regulations, and specific cleanup techniques. 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 landloss, particularly in Louisiana. The incremental contribution of the WPA or CPA proposed action to the cumulative impacts on coastal wetlands is expected to be small.

Seagrass Communities: Turbidity impacts from pipeline installation and maintenance dredging associated with the WPA and CPA proposed actions would be temporary and localized. The incremental impacts from service-vessel transit associated with the WPA and CPA proposed actions 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 and Low Relief) 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, and there would be limited incidences of mortality.

Topographic Features: The routine activities associated with the WPA and CPA proposed actions that would 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 would 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.

Sargassum Communities: The impacts to *Sargassum* that are associated with the WPA and CPA proposed actions 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 WPA and CPA proposed actions.

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 WPA and CPA proposed actions. However, the policy requirements described in Notice to Lessees and Operators (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 WPA and CPA proposed actions 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 WPA or CPA proposed action that would impact soft bottoms generally occur within a few hundred meters of platforms, and the greatest impacts are seen close to the platform communities. Although localized impacts to comparatively small areas of the soft bottom benthic communities would occur, the impacts would be on a relatively small area of the seafloor compared with the overall area of the seafloor of the WPA (115,645 square kilometers [km^2]; 44,651 square miles [mi^2]) or the CPA (268,922 km^2; 103,831 mi^2). The WPA or CPA proposed action is expected to have a negligible impact on soft bottom environments because the local 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 related to the WPA or CPA proposed action are not expected to have adverse effects on the size and productivity of any marine mammal species or population in the northern Gulf of Mexico. Characteristics of impacts from accidental events depend on chronic or acute exposure from accidental events resulting in harassment, harm, or mortality to marine mammals, while exposure to dispersed hydrocarbons is likely to result in sublethal impacts.

Sea Turtles: Routine activities resulting from the WPA or 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 mitigations that are in place. Accidental events associated with the WPA and CPA proposed action have the potential to impact small to large numbers of sea turtles. Populations of sea turtles in the northern Gulf of Mexico may be exposed to residuals of oils spilled as a result of the WPA or CPA proposed action during their lifetimes. While chronic or acute exposure from accidental events may result in the harassment, harm, or mortality to 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 WPA or CPA proposed action would not be likely to result in a significant incremental impact on sea turtles within the WPA and CPA; in comparison, non-OCS energy-related activities, such as overexploitation, commercial fishing, and pollution, have historically proved to be of greater threat to the sea turtle species.

Diamondback Terrapins: The routine activities of the WPA or 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 WPA or CPA proposed action are not expected to impact terrapins or their habitat. The incremental effect of the WPA or 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.

Alabama, Choctawhatchee, St. Andrew, and Perdido Key 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, large-scale oiling of beach mice could result in extinction, and, 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 resulting from routine activities associated with the WPA or CPA proposed action on threatened and endangered and nonthreatened and nonendangered avian species are expected to be adverse, but not significant. These impacts include behavioral effects, exposure to or intake of OCS-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 WPA or 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 WPA or 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 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 WPA or CPA proposed action. Accidental events that could impact fish resources and essential fish habitat include blowouts and oil or chemical spills. If a spill were to occur as a result of the WPA or CPA proposed action, the impacts of the spill on fish and essential fish habitats would depend on multiple factors, including the amount spilled, the areal extent of the spill, the distance of the spill from especially sensitive fish and shellfish habitats (e.g., nursery habitats), the time of year, 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 that many are found and because of the distance that these low-probability spills would occur from many of the biologically sensitive fish habitats (due to stipulations, NTL's, and other mitigation measures). 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 WPA and CPA, such as seismic surveys and pipeline trenching, would cause negligible impacts and would not deleteriously affect commercial fishing activities. 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 a well blowout or an oil spill, associated with the WPA and CPA proposed actions are anticipated to be minimal. Commercial fishermen are anticipated to avoid the area of a well blowout or 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 WPA or CPA proposed action. The WPA or CPA proposed action could also lead to low-level environmental degradation of fish habitat, which would 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 in the vicinity of the oil spill. Except for a catastrophic spill such as 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 actions 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 WPA or 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 catastrophic spill such as 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 WPA or 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 oil and gas 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 WPA or 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 WPA or CPA proposed action would not require additional coastal infrastructure, with the exception of possibly one new gas processing facility and one new pipeline landfall, and it would not alter the current land use of the analysis area. The existing oil and gas infrastructure is expected to be sufficient to handle development associated with the WPA or 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, blowouts, 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 WPA or CPA proposed action is projected to minimally affect the demography of the analysis area. Population impacts from the WPA or 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 **Chapters 4.1.1.20 and 4.2.1.23**, are expected to remain unchanged as a result of the WPA or CPA proposed action. The increase in employment is expected to be met primarily with the existing population and available labor force, with the exception of some in-migration (from elsewhere within or outside the U.S.), which is projected to move into focal areas such as Port Fourchon. Accidental events associated with the WPA or CPA proposed action, such as oil or chemical spills, blowouts, and vessel collisions, would likely have no effects on the demographic characteristics of the Gulf coastal communities.

Economic Factors: The WPA or CPA proposed action is expected to generate a <1 percent increase in employment in any of the coastal subareas, even when the net employment impacts from accidental events are included. Most of the employment related to the WPA or CPA proposed action is expected to occur in 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 exploration, development, and production. Because the onshore infrastructure support system for OCS-related industry (and its associated labor force) is highly developed, widespread, and has operated for decades within a heterogeneous Gulf of Mexico population, the WPA and CPA proposed actions are not expected to have disproportionately high or adverse environmental or health effects on minority or low-income people. The WPA and CPA proposed actions 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**.

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS AND ACRONYMS

°C	degree Celsius
°F	degree Fahrenheit
ac	acre
AEDP	area evaluation and decision process
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
ASLM	Assistant Secretary of the Interior for Land and Minerals
BAST	best available and safest technology
bbl	barrel
BBO	billion barrels of oil
BCR	Bird Conservation Region
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
CAA	Clean Air Act of 1970
CAAA	Clean Air Act Amendments of 1990
CAMx	Comprehensive Air Quality Model with extensions
CD	Consistency Determination
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CG	Coast Guard (also: USCG)
CMP	Coastal Management Plans
CO	carbon monoxide
CO_2	carbon dioxide
COE	Corps of Engineers (U.S. Army)
CPA	Central Planning Area
CSA	Continental Shelf Associates
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Act
DOCD	development operations coordination document
DOD	Department of Defense (U.S.) (also: USDOD)
DOI	Department of the Interior (U.S.) (also: USDOI)
DPP	development and production plan
EA	environmental assessment
EFH	essential fish habitat
e.g.	for example
EIA	Economic Impact Area
EIS	environmental impact statement
EP	exploration plan
EPA	Eastern Planning Area
ERMA	Environmental Response Management Application
ESA	Endangered Species Act of 1973
ESP	Environmental Studies Program
ESPIS	Environmental Studies Program Information System
et al.	and others
et seq.	and the following
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 Environmental Impact Statement*
FL	Florida
FPSO	floating production, storage, and offloading system
FR	*Federal Register*
ft	feet
FWS	Fish and Wildlife Service
G&G	geological and geophysical
g	gram
gal	gallon
GMFMC	Gulf of Mexico Fishery Management Council
GOM	Gulf of Mexico
GS	Geological Survey (also: USGS)
GWEI	Gulfwide Emissions Inventory
H_2S	hydrogen sulfide
ha	hectare
i.e.	specifically
in	inch
JITF	Joint Industry Task Force
kg	kilogram
kg/d	kilogram/day
km	kilometer
L	liter
LA	Louisiana
LNG	liquefied natural gas
m	meter
MARPOL	International Convention for the Prevention of Pollution from Ships
mi	mile
MMbbl	million barrels
MMPA	Marine Mammal Protection Act of 1972
MMS	Minerals Management Service
MOA	Memorandum of Agreement
MODU	mobile offshore drilling unit
MOU	Memorandum of Understanding
MS	Mississippi
2007-2012 WPA/CPA Multisale EIS	*Gulf of Mexico OCS Oil and Gas Lease Sales: 2007-2012; 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*
NAAQS	National Ambient Air Quality Standards
NASA	National Aeronautics and Space Administration
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
nmi	nautical-mile
NO_2	nitrogen dioxide
NO_x	nitrogen oxides
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent to Prepare an EIS
NOS	National Ocean Service
NPDES	National Pollutant and Discharge Elimination System
NRC	National Research Council
NRDA	Natural Resource Damage Assessment
NTL	Notice to Lessees and Operators
O_3	ozone
OCD	Offshore Coastal Dispersion

OCS	Outer Continental Shelf
OCSLA	Outer Continental Shelf Lands Act
OSAT	Operational Science Advisory Team
OSHA	Occupational Safety and Health Administration
OSRA	Oil Spill Risk Analysis
P.L.	Public Law
PAH	polycyclic aromatic hydrocarbons
$PM_{2.5}$	particulate matter less than or equal to 2.5 μm
PM_{10}	particulate matter less than or equal to 10 μm
ppm	parts per million
PSD	Prevention of Significant Deterioration
ROD	Record of Decision
ROTAC	Regional Operations Technology Assessment Committee
ROV	remotely operated vehicle
RP	Recommended Practice
RTR	Rigs-to-Reefs
SCAT	Shoreline Cleanup and Assessment Team
Secretary	Secretary of the Interior
SO_x	sulphur oxides
Stat.	Statute
STOF-THPO	Seminole Tribe of Florida-Tribal Historic Preservation Officer
sVGP	Small Vessel General Permit
TA&R	Technology Assessment & Research Program
Tcf	trillion cubic feet
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
USDOD	U.S. Department of Defense (also: DOD)
USDOE	U.S. Department of the Energy
USDOI	U.S. Department of the Interior (also: DOI)
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey (also: GS)
VGP	Vessel General Permit
VOC	volatile organic compound
VSP	vertical seismic profiling
W.	west
WPA	Western Planning Area

CONVERSION CHART

To convert from	To	Multiply by
millimeter (mm)	inch (in)	0.03937
centimeter (cm)	inch (in)	0.3937
meter (m)	foot (ft)	3.281
kilometer (km)	mile (mi)	0.6214
meter^2 (m^2)	foot^2 (ft^2)	10.76
	yard^2 (yd^2)	1.196
	acre (ac)	0.0002471
hectare (ha)	acre (ac)	2.47
kilometer^2 (km^2)	mile^2 (mi^2)	0.3861
meter^3 (m^3)	foot^3 (ft^3)	35.31
	yard^3 (yd^3)	1.308
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
tonnes = 1 long ton or 2,200 lb
1 nautical mile (nmi) = 6,076 ft or 1.15 mi

CHAPTER 1

THE PROPOSED ACTIONS

1. THE PROPOSED ACTIONS

1.1. PURPOSE OF AND NEED FOR THE PROPOSED ACTIONS

The proposed Federal actions addressed in this Supplemental Environmental Impact Statement (EIS) are to offer for lease certain Outer Continental Shelf (OCS) blocks located in the Western Planning Area (WPA) and Central Planning Area (CPA) in the Gulf of Mexico (GOM) that may contain economically recoverable oil and gas resources. This Supplemental EIS addresses two proposed Federal actions: one oil and gas lease sale in the WPA and one oil and gas lease sale in the CPA of the Gulf of Mexico OCS, 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 EIS 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). The 2012-2017 WPA/CPA Multisale EIS notes that two sales may be held each year during the Five-Year Program—one in the WPA and one in the CPA. The two proposed sales that are evaluated in this Supplemental EIS, proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231, are tentatively scheduled to be held in August 2013 and in early 2014, respectively. The purpose of the proposed Federal actions 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*. [1988]). The proposed lease sales 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.

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 WPA and CPA since publication of the 2012-2017 WPA/CPA Multisale EIS. This Supplemental EIS analyzes the potential impacts of proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231 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.

The need for the proposed actions is to further the orderly development of OCS resources. Oil serves as the feedstock for liquid hydrocarbon products; among them are gasoline, aviation and diesel fuel, and various petrochemicals. Oil from the WPA and CPA would help reduce the Nation's need for oil imports and lessen a growing dependence on foreign oil. The United States (U.S.) consumed 18.8 million barrels (MMbbl) of oil per day in 2011 (USDOE, Energy Information Administration, 2012a). The Energy Information Administration projects the total U.S. consumption of liquid fuels, including both fossil fuels and biofuels, to grow from 19.2 MMbbl per day in 2012 to 19.9 MMbbl per day in 2035 (USDOE, Energy Information Administration, 2012b). Altogether, net imports of crude oil and petroleum products (imports minus exports) accounted for 45 percent of our total petroleum consumption in 2011. The U.S. crude oil imports stood at 8.4 MMbbl per day in 2011. Petroleum product imports were 2.4 MMbbl per day in 2011. Exports totaled 2.9 MMbbl per day in 2011, mainly in the form of distillate fuel oil, petroleum coke, and residual fuel oil. Our biggest supplier of crude oil and petroleum-product imports was Canada (29%), with countries in the Persian Gulf being the second largest source (22%) in 2011 (USDOE, Energy Information Administration, 2012c). Oil produced from the WPA and CPA would also reduce the environmental risks associated with transoceanic oil tankering from sources overseas.

This Supplemental EIS's analyses also focus on the potential environmental effects of oil and natural gas leasing, exploration, development, and production in the areas identified through the Area Identification procedure as the proposed lease sale areas. In addition to the No Action alternative (i.e., cancel the sale), other alternatives may be considered for each proposed lease sale, such as deferring certain areas from the proposed lease sales.

The Secretary of the Interior (Secretary) has designated the Bureau of Ocean Energy Management (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. Effective October 1, 2011, the Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) was reorganized and separated into two separate bureaus, the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE). BOEM is responsible for managing development of

the Nation's offshore resources in an environmentally and economically responsible way. The functions of BOEM include leasing, exploration and development, plan administration, environmental studies, NEPA analysis, resource evaluation, economic analysis, and the renewable energy program. The BSEE is 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.

The WPA and CPA of the Gulf of Mexico constitute one of the world's major oil and gas producing areas, and have proved a steady and reliable source of crude oil and natural gas for more than 50 years. Oil and gas from the Gulf of Mexico can help reduce the Nation's need for imports and reduce the environmental risks associated with oil and gas tankering.

1.2. DESCRIPTION OF THE PROPOSED ACTIONS

The proposed actions are the next two oil and gas lease sales scheduled in the Five-Year Program, one each in the WPA and CPA. Federal regulations allow for several related or similar proposals to be analyzed in one EIS (40 CFR 1502.4); therefore, BOEM has decided to prepare a single Supplemental EIS for proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231.

Proposed WPA Lease Sale 233

Proposed WPA Lease Sale 233 is tentatively scheduled to be held in August 2013. The proposed WPA lease sale area encompasses virtually all of the WPA's 28.58 million acres (ac). This area begins 3 marine leagues (9 nautical miles [nmi]; 10.36 miles [mi]; 16.67 kilometers [km]) offshore Texas and extends seaward to the limits of the United States' jurisdiction over the continental shelf (often the Exclusive Economic Zone) in water depths up to approximately 3,346 meters (m) (10,978 feet [ft]) (Figure 1-1 of the 2012-2017 WPA/CPA Multisale EIS). As of March 2013, approximately 20.7 million ac of the proposed WPA lease sale area are currently unleased. Proposed WPA Lease Sale 233 would offer for lease all unleased blocks in the WPA for oil and gas operations (Figure 1-1 of the 2012-2017 WPA/CPA Multisale EIS), with the following exception:

(1) whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary (i.e., the boundary as of the publication of this Supplemental EIS).

Although the leasing of portions of the WPA and CPA (subareas or blocks) can be deferred during a Five-Year Program, the U.S. Department of the Interior (DOI) is conservative throughout the NEPA process and includes the total area within the Gulf of Mexico planning areas for analysis.

The estimated amount of resources projected to be developed as a result of proposed WPA Lease Sale 233 is 0.116-0.200 billion barrels of oil (BBO) and 0.538-0.938 trillion cubic feet (Tcf) of gas. Proposed WPA Lease Sale 233 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 2.3.1.3 of the 2012-2017 WPA/CPA Multisale EIS.

Proposed CPA Lease Sale 231

Proposed CPA Lease Sale 231 is tentatively scheduled to be held in early 2014. 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 over the continental shelf (often the Exclusive Economic Zone) in water depths up to approximately 3,346 m (10,978 ft) (Figure 1-1 of the 2012-2017 WPA/CPA Multisale EIS). As of March 2013, approximately 43.0 million ac of the proposed CPA lease sale area are currently unleased. Proposed CPA Lease Sale 231 would offer for lease all unleased blocks in the CPA for oil and gas operations (Figure 1-1 of the 2012-2017 WPA/CPA Multisale EIS), 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.

Although the leasing of portions of the CPA and WPA (subareas or blocks) can be deferred during a Five-Year Program, DOI is conservative throughout the NEPA process and includes the total area within the Gulf of Mexico for analysis.

The estimated amount of resources projected to be developed as a result of proposed CPA Lease Sale 231 is 0.460-0.894 BBO and 1.939-3.903 Tcf of gas. Proposed CPA Lease Sale 231 includes proposed lease stipulations designed to reduce environmental risks; these stipulations are discussed in **Chapter 2.4.1.3** of this Supplemental EIS and in Chapter 2.4.1.3 of the 2012-2017 WPA/CPA Multisale EIS.

1.3. REGULATORY FRAMEWORK

Federal laws mandate the OCS leasing program (e.g., Outer Continental Shelf Lands Act) 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 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.

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 930.76
Endangered Species Act of 1973	16 U.S.C. 1631 *et seq*.
Magnuson-Stevens Fishery Conservation and Management Act	16 U.S.C. 1251 *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 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 55
Clean Water Act	33 U.S.C. 1251 *et seq*.
Harmful Algal Bloom and Hypoxia Research and Control Act	P.L. 105-383
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. 2601 *et seq*.
Fishermen's Contingency Fund	43 U.S.C. 1841-1846
Ports and Waterways Safety Act of 1972	33 U.S.C. 1223 *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
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	16 U.S.C. 470 *et seq*.
Rivers and Harbors Act of 1899	33 U.S.C. 401 *et seq*.
Occupational Safety and Health Act of 1970	29 U.S.C. 651 *et seq*.
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 *et seq*.
Submerged Lands Act of 1953	43 U.S.C. 1301 *et seq*.
49 U.S.C. 44718: 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 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. Rule Changes for the Reorganization of Title 30 for the Bureau of Ocean Energy Management and the Bureau of Safety and Environmental Enforcement

All regulatory citations identified in this Supplemental EIS are concordant with the regulation changes made following the creation of the Bureau of Ocean Energy Management and the Bureau of Safety and Environmental Enforcement; the effective date of this reorganization of the regulations is October 1, 2011 (*Federal Register*, 2011a).

On May 19, 2010, U.S. Dept. of the Interior Secretary Salazar announced in Secretarial Order 3299 (USDOI, 2010b) that the Bureau of Ocean Energy Management, Regulation and Enforcement would be reorganized into two new bureaus within DOI and that each bureau would be reporting to the Assistant Secretary Land and Minerals Management. These bureaus are now known as the Bureau of Ocean Energy Management (BOEM) and the Bureau of Safety and Environmental Enforcement (BSEE). The mission of these new bureaus was announced by the Secretary (USDOI, 2010b). BOEM is responsible for managing development of the Nation's offshore resources in an environmentally and economically

responsible way. The functions of BOEM include leasing, exploration and development, plan administration, environmental studies, NEPA analysis, resource evaluation, economic analysis, and the renewable energy program. The BSEE is 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.

The primary OCS oil and gas operations' regulations that are administered by BSEE remain in 30 CFR 250, and the primary OCS oil and gas operations' regulations that are administered by BOEM are in 30 CFR 550. A summary breakdown of responsibility for the regulations under Title 30 is provided in Table 1-3 of the 2012-2017 WPA/CPA Multisale EIS.

1.3.2. Recent BOEM/BSEE Rule Changes

In light of the *Deepwater Horizon* explosion, oil spill, and cleanup, 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 cleanup 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, refer to the 2012-2017 WPA/CPA Multisale EIS.

1.3.2.1. Recent Rule Changes

Following the *Deepwater Horizon* explosion, oil spill, and cleanup, this Agency published a number of regulations and guidance documents (e.g., Notices to Lessees and Operators [NTL's]), which are described more fully in Chapters 1.3.1.1 and 1.5 of the 2012-2017 WPA/CPA Multisale EIS.

This Agency determined that issuance of an interim rule on drilling safety was needed after the *Deepwater Horizon* explosion, oil spill, and cleanup. This rule implements the recommendations from the report entitled, Increased Safety Measures for Energy Development on the Outer Continental Shelf ("30-Day Report" or "Safety Measures Report") (USDOI, 2010a) considered by the Secretary to be the most important for safe resumption of offshore drilling operations. On October 14, 2010, the interim final rule (IFR) was published in the Federal Register (2010b), together with a discussion of the comments that had been received by the Secretary in the period leading up to promulgation of the rule. The interim rulemaking revises selected sections of 30 CFR 250 Subparts D, E, F, O, and Q. Only a portion of the proposed changes in Subpart D add material capital or operating costs (some of which may be significant). For example, identical costly new requirements for subsea function testing of remotely operated vehicle (ROV) intervention during drill operations (Subpart D) apply to well completion (Subpart E) and workover (Subpart F) operations.

On August 22, 2012, the final rule was published in the *Federal Register* (2012a). The final rule became effective on October 22, 2012, implementing certain safety measures recommended in the Safety Measures Rule (USDOI, 2010a). The BSEE has implemented the appropriate recommendations in the Safety Measures Report and in the *Deepwater Horizon* Joint Investigation Team report by amending 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. This rulemaking

- establishes new casing installation requirements;
- establishes new cementing requirements;
- requires independent third-party verification of blind-shear ram capability;
- requires new casing and cementing integrity tests;
- establishes new requirements for subsea secondary blowout preventer (BOP) intervention;
- requires function testing for subsea secondary BOP intervention;
- requires documentation for BOP inspections and maintenance;

- requires a registered professional engineer to certify casing and cementing requirements; and
- establishes new requirements for specific well-control training to include deepwater operations.

After reviewing the comments, BSEE retained many of the provisions adopted in the IFR without change. However, the final rule did change the IFR in the following ways:

- Updated the incorporation by reference to the second edition of API Standard 65—Part 2, which was issued in December 2010. This standard outlines the process for isolating potential flow zones during well construction. The new Standard 65—Part 2 enhances the description and classification of well-control barriers, and it defines testing requirements for cement to be considered a barrier.
- Revised requirements from the IFR on the installation of dual mechanical barriers in addition to cement for the final casing string (or liner if it is the final string) to prevent flow in the event of a failure in the cement. The final rule provides that, for the final casing string (or liner if it is the final string), an operator must install one mechanical barrier in addition to cement to prevent flow in the event of a failure in the cement. The final rule also clarifies that float valves are not mechanical barriers.
- Revised 30 CFR 250.423(c) to require the operator to perform a negative pressure test only on wells that use a subsea BOP stack or wells with a mudline suspension system instead of on all wells, as was provided in the IFR.
- Added new 30 CFR 250.451(j), stating that an operator must have two barriers in place before removing the BOP and that the BSEE District Manager may require additional barriers.
- Extended the requirements for BOP's and well-control fluids to well-completion, well-workover, and decommissioning operations under 30 CFR 250 Subpart E—"Oil and Gas Well-Completion Operation," 30 CFR 250 Subpart F—"Oil and Gas Well-Workover Operations," and 30 CFR 250 Subpart Q—"Decommissioning Activities" to promote consistency in the regulations.

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

BOEM and BSEE have already instituted regulatory reforms responsive to many of the recommendations expressed in the various reports prepared following the *Deepwater Horizon* explosion, oil spill, and cleanup. 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 above and in the 2012-2017 WPA/CPA Multisale 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.

1.3.2.3. Recent and Ongoing Industry Reform and Research

Shortly after the *Deepwater Horizon* explosion, oil spill, and cleanup, various industry trade associations formed four Joint Industry Task Forces (JITF's) to learn from the *Deepwater Horizon* explosion, oil spill, and cleanup and to advance industry practices. The JITF's are comprised of member companies and affiliates of API, the International Association of Drilling Contractors, Independent Petroleum Association of America, National Ocean Industries Association, and U.S. Oil and Gas Association. The ultimate objectives of the JITF's are to reduce risk and to improve the industry's capabilities in safety, environmental performance, and spill prevention and response. Chapter 1.3.1.3 of

the 2012-2017 WPA/CPA Multisale EIS describes in detail the recommendations from the JITF's that have led to the reform of industry standards, recommended practices, and guidelines.

1.4. PRELEASE PROCESS

Scoping for this Supplemental EIS was conducted in accordance with Council on Environmental Quality (CEQ) regulations implementing NEPA. Scoping provides those with an interest in the OCS Program an opportunity to provide comments on the proposed actions. In addition, scoping provides BOEM an opportunity to update the Gulf of Mexico OCS Region's environmental and socioeconomic information base. The scoping process officially commenced on July 9, 2012, with the publication of the Notice of Intent to Prepare an EIS (NOI) in the *Federal Register*. 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 August 8, 2012. The public scoping period was reopened on August 24, 2012, due to a typographical error in the original NOI, and the reopened scoping period closed on September 10, 2012. Federal, State, and local governments, along with other interested parties, were invited to send written comments to the Gulf of Mexico OCS Region on the scope of the Supplemental EIS. Comments were received in response to the NOI from Federal, State, and local government agencies; interest groups; industry; businesses; and the general public on the scope of the Supplemental EIS, significant issues that should be addressed, alternatives that should be considered, and mitigation measures. All scoping comments received were considered in the preparation of the Draft Supplemental EIS. The comments have been summarized in **Chapter 5.3**, "Development of the Draft Supplemental EIS."

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 sales and this Supplemental EIS. Key agencies and organizations included the National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (FWS), U.S. Department of Defense (DOD), U.S. Coast Guard (USCG), U.S. Environmental Protection Agency (USEPA), State governors' offices, and industry groups.

Although the scoping process was formally initiated on July 9, 2012, with the publication of the NOI in the *Federal Register*, and reopened on August 24, 2012, scoping efforts and other coordination meetings have proceeded and will continue to proceed throughout this NEPA process. Scoping and coordination opportunities are available during BOEM's requests for information, comments, input, and review on other Bureau of Ocean Energy Management NEPA documents.

On October 4, 2012, BOEM released its Area Identification (Area ID) decision. One Area ID was prepared for proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231. The Area ID is an administrative prelease step that describes the geographical area of the proposed actions (proposed lease sale areas) 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 proposed actions on the marine, coastal, and human environments.

BOEM sent copies of the Draft Supplemental EIS for review and comment to Federal, State, and local government agencies; interest groups; 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*. In addition, public notices were mailed with the Draft Supplemental EIS and were placed on BOEM's Internet website (http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/nepaprocess.aspx). Consistent with 40 CFR 1502.9 regarding preparation of a supplemental EIS, no scoping meetings were required for the Draft Supplemental EIS.

A consistency review will be performed and a Consistency Determination (CD) will be prepared for each affected State prior to each proposed lease sale. To prepare the CD's, BOEM reviews each 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 Director makes an assessment of consistency, which is then sent to each State with the Proposed Notice of Sale (NOS). If a State disagrees with BOEM's CD, the State is required to do the following under the Coastal Zone Management Act (CZMA): (1) indicate how BOEM's presale proposal is inconsistent with its CMP; (2) suggest alternative measures to bring BOEM's proposal into consistency with their CMP; or (3) 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 presale activities. In the event of a disagreement between a Federal agency and the State CMP

regarding consistency of the proposed lease sale, either BOEM or the State may request mediation. The regulations provide for an opportunity to resolve any differences with the State, but CZMA allows BOEM to proceed with the lease sale despite any unresolved disagreements if the Federal agency clearly describes, in writing, to the State CMP how the activity is consistent to the maximum extent practicable.

This Final Supplemental EIS will be published for public review at least 30 days prior to a decision on whether to hold proposed WPA Lease Sale 233, which is tentatively scheduled to be held in August 2013. To initiate the public review, BOEM will publish an NOA in the *Federal Register*. BOEM will send copies of this Final Supplemental EIS for review to Federal, State, and local agencies; interest groups; and local libraries. In addition, public notices will be mailed with this Final Supplemental EIS and will be placed on BOEM's Internet website (http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/nepaprocess.aspx). After the end of the comment period, DOI will review this Final Supplemental EIS and any comments received before making a decision on the proposed lease sale.

This Final Supplemental EIS is not a decision document. A Record of Decision (ROD) will be prepared for the decision on whether to hold each lease sale, i.e., one for proposed WPA Lease Sale 233 and one for proposed CPA Lease Sale 231. The ROD's will identify BOEM's preferred alternative for each lease sale, as well as the environmentally preferable alternative, if different. The ROD's will summarize the proposed actions and the alternatives evaluated in this Supplemental EIS, the conclusions of the impact analyses, and other information considered in reaching the decision. All relevant comments received on this Final Supplemental EIS will be addressed in the ROD's.

A Proposed NOS will become available to the public 4-5 months prior to each 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 decision by the Assistant Secretary of the Interior for Land and Minerals Management (ASLM) is to hold a proposed lease sale, a Final NOS will be published in its entirety in the *Federal Register* at least 30 days prior to the 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 Five-Year Program EIS (USDOI, BOEM, 2012c) 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 Coastal and Marine Spatial 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 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/. A link to the table will be provided in the lease sale documents and in the annual report, which is discussed below.

- **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, while the NOI requests comments 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 this 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.

- **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, BOEM has been assigned as the Federal co-lead, along with the U.S. Coast Guard 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 USDOI lead. In the Gulf of Mexico OCS Region, BOEM representatives will assist 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 CMSP 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 now 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 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 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, NTL's, and project-specific requirements or approval conditions. 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. Standard mitigation measures in the Gulf of Mexico OCS include the following:

- limiting the size of explosive charges used for structure removals (NTL 2010-G05);
- requiring placement of explosive charges at least 15 ft (5 m) below the mudline;
- requiring site-clearance procedures to eliminate potential snags to commercial fishing nets upon abandonment;
- establishment of No Activity and Modified Activity Zones around high-relief live bottoms;
- requiring remote-sensing surveys to detect and avoid potential archaeological sites and biologically sensitive areas such as low-relief live bottoms, pinnacles, and chemosynthetic communities; and
- requiring coordination with the military to prevent multiuse conflicts between OCS and military activities.

BOEM issues NTL's 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 current Gulf of Mexico OCS Region NTL's is available through BOEM's Gulf of Mexico OCS Region's Internet 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.

Formal plans must be submitted to BOEM 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. Conditions of approval are mechanisms to control or mitigate potential safety or environmental problems associated with proposed operations. 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 of easement, or pipeline right-of-way grant.

Some BOEM-identified mitigation measures are implemented through cooperative agreements or coordination with the oil and gas industry and Federal and State agencies. These measures include NMFS's 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.

The following postlease activity descriptions apply to the proposed WPA and CPA lease sale areas.

Geological and Geophysical Activities

A geological and geophysical (G&G) permit must be obtained from BOEM prior to conducting off-lease geological or geophysical exploration or scientific research on unleased OCS lands or on lands under lease to a third party (30 CFR 551.4 (a) and (b)). Geological investigations include various seafloor sampling techniques to determine the geochemical, geotechnical, or engineering properties of the sediments.

A detailed description of postlease geological and geophysical activities, including ancillary activities and NTL's, are described in Chapter 1.5 of the 2012-2017 WPA/CPA Multisale EIS.

Exploration and Development Plans

To ensure conformance with the OCSLA, other laws, applicable regulations, and lease provisions, and to enable BOEM to carry out its functions and responsibilities, formal plans (30 CFR 550.211 and 550.241) with supporting information must be submitted for review and approval by BOEM before an operator may begin exploration, development, or production activities on any lease. Supporting environmental information, archaeological reports, biological reports (monitoring and/or live-bottom survey), and other environmental data determined necessary must be submitted with an OCS plan. This information provides the basis for an analysis of both offshore and onshore impacts that may occur as a result of the activities. BOEM may require additional specific supporting information to aid in the evaluation of the potential environmental impacts of the proposed activities. BOEM can require amendment of an OCS plan based on inadequate or inaccurate supporting information. The latest 30 CFR 550 Subpart B regulations became effective on October 1, 2011 (*Federal Register*, 2011a).

The OCS plans are reviewed as appropriate by geologists, geophysicists, engineers, biologists, archaeologists, air quality specialists, oil-spill specialists, NEPA coordinators, and/or environmental scientists. The plans and accompanying information are evaluated to determine whether any seafloor or drilling hazards are present; that air and water quality issues are addressed; that plans for hydrocarbon resource conservation, development, and drainage are adequate; that environmental issues and potential impacts are properly evaluated and mitigated; and that a proposed action is in compliance with NEPA, CZMA, BOEM operating regulations, and other requirements. Federal agencies, including FWS, NMFS, USEPA, the U.S. Navy, the U.S. Air Force, and USCG, may be consulted if the proposal has the potential to impact areas under their jurisdiction. Each Gulf Coast State has a designated CZM agency that takes part in the review process. The OCS plans are also made available to the general public for comment through BOEM's Gulf of Mexico OCS Region's Public Information Office.

In response to deepwater activities in the Gulf of Mexico, this Agency developed a comprehensive strategy to address NEPA compliance and environmental issues in the deepwater areas. A key component of that strategy was the completion of a Programmatic Environmental Assessment (EA) to evaluate the potential effects of the deepwater technologies and operations (USDOI, MMS, 2000). As a supplement to the Programmatic EA, this Agency prepared a series of technical papers that provide a summary description of the different types of structures that may be employed in the development and production of hydrocarbon resources in the deepwater areas of the GOM (Regg et al., 2000). Information in the Programmatic EA and technical papers were used in the preparation of this Supplemental EIS.

On the basis of BOEM's reviews of the OCS plan, the findings of the proposal-specific categorical exclusion review, EA, or EIS, and other applicable BOEM studies and NEPA documents, the OCS plan is approved or disapproved by BOEM, or modified and resubmitted for further analyses and decision. Although few OCS plans are ultimately disapproved, many must be amended prior to approval to fully comply with BOEM's operating regulations and requirements, or other Federal laws, to address reviewing agencies' concerns, or to avoid potential hazards or impacts to environmental resources.

The following types of exploration and development plans are described in detail in Chapter 1.5 of the 2012-2017 WPA/CPA Multisale EIS:

- exploration plans;
- deepwater operations plans;
- conservation reviews;
- development operations and coordination documents;
- new or unusual technologies; and
- emergency plans.

Permits and Applications

After exploration plan (EP) or development operations and coordination document (DOCD) approval, the operator submits applications for specific activities to BOEM for approval. These applications include those for drilling wells; well-test flaring; temporary well abandonment; installing a well protection structure, production platforms, satellite structures, subsea wellheads and manifolds, and pipelines; installation of production facilities; commencing production operations; platform removal and lease abandonment; and pipeline decommissioning. A detailed description of permits and applications for wells, platforms and structures, and pipelines can be found in Chapter 1.5 of the 2012-2017 WPA/CPA Multisale EIS.

Inspection and Enforcement

The OCSLA authorizes and requires BSEE to provide for an annual scheduled inspection and a periodic unscheduled (unannounced) inspection of all oil and gas operations on the OCS. The inspections are to assure compliance with all regulatory constraints that allowed commencement of the operation.

The primary objective of an initial inspection is to assure proper installation of mobile drilling units and fixed structures, and proper functionality of their safety and pollution prevention equipment. After operations begin, additional announced and unannounced inspections are conducted. Unannounced inspections are conducted to foster a climate of safe operations, to maintain a BSEE presence, and to focus on operators with a poor performance record. These inspections are also conducted after a critical safety feature has previously been found defective. Poor performance generally means that more frequent, unannounced inspections may be conducted on a violator's operation.

The annual inspection examines all safety equipment designed to prevent blowouts, fires, spills, or other major accidents. These annual inspections involve the inspection for installation and performance of all facilities' safety-system components.

The inspectors follow the guidelines as established by the regulations, API Recommended Practice (RP) 14C, and the specific BSEE-approved plan. The BSEE inspectors perform these inspections using a national checklist called the Potential Incident of Noncompliance list. This list is a compilation of yes/no questions derived from all regulated safety and environmental requirements.

The BSEE administers an active civil penalties program (30 CFR 250 Subpart N). A civil penalty in the form of substantial monetary fines may be issued against any operator that commits a violation that may constitute a threat of serious, irreparable, or immediate harm or damage to life, property, or the environment. The BSEE may make recommendations for criminal penalties if a willful violation occurs. In addition, the regulation at 30 CFR 250.173(a) authorizes suspension of any operation in the Gulf of Mexico OCS Region if the lessee has failed to comply with a provision of any applicable law, regulation, or order or provision of a lease or permit. Furthermore, the Secretary may invoke his authority under 43 U.S.C. 1334(c) and 30 CFR 550.185(c) to cancel a nonproductive lease with no compensation. Exploration and development activities may be canceled under 30 CFR 550.182 and 550.183.

Pollution Prevention, Oil-Spill Response Plans, and Financial Responsibility

Pollution prevention is addressed through proper design and requirements for safety devices. The BSEE regulations at 30 CFR 250.400 require that the operator take all necessary precautions to keep its wells under control at all times. The lessee is required to use the best available and safest drilling technology in order to enhance the evaluation of conditions of abnormal pressure and to minimize the potential for the well to flow or kick. Redundancy is required for critical safety devices that will shut off flow from the well if loss of control is encountered. A complete description of rule changes implemented as a result of the *Deepwater Horizon* explosion, oil spill, and cleanup is detailed in **Chapter 1.3.2**.

A detailed description of pollution prevention measures, blowout preventers, oil-spill response plans, and financial responsibility are described in detail in Chapter 1.5 of the 2012-2017 WPA/CPA Multisale EIS.

Air Emissions

The OCSLA (43 U.S.C. 1334(a)(8)) requires the Secretary of the Interior to promulgate and administer regulations that comply with the National Ambient Air Quality Standards (NAAQS), pursuant

to the Clean Air Act (CAA) (42 U.S.C. 7401 *et seq*.), to the extent that authorized activities significantly affect the air quality of any State. Under provisions of the CAA Amendments (CAAA) of 1990, USEPA's Administrator has jurisdiction and, in consultation with the Secretary of the Interior and the Commandant of the Coast Guard, established the requirements to control air pollution in OCS areas of the Pacific, Atlantic, Arctic, and eastward of 87.5° W. longitude in the Gulf of Mexico. Air quality in the OCS area westward of 87.5° W. longitude in the Gulf is under BOEM jurisdiction.

For OCS air emission sources located east of 87.5° W. longitude and within 25 mi (40 km) of the States' seaward boundaries, the requirements are the same as would be applicable if the source were located in the corresponding onshore area. The USEPA requirements for these OCS areas are at 40 CFR 55, Appendix A. For air emission sources located east of 87.5° W. longitude and more than 25 mi (40 km) from the States' seaward boundaries, sources are subject to Federal requirements as specified in 40 CFR 52.13. The USEPA regulations also establish procedures that allow the USEPA Administrator to exempt any OCS source from an emissions control requirement if it is technically infeasible or poses unreasonable threat to health or safety.

This Agency issued NTL 2009-N11 to clarify that its regulatory authority and the implementing regulations in 30 CFR 250 Subpart C and 30 CFR 550 apply only to those air emission sources in the Gulf of Mexico westward of 87.5° W. longitude. The regulated pollutants include carbon monoxide, suspended particulates, sulphur dioxide, nitrogen oxides, total hydrocarbons, and volatile organic compounds. All new or supplemental EP's and DOCD's must include air emissions information sufficient to determine whether an air quality review is required (30 CFR 550.218 and 550.249). BOEM's regulations require a review of air quality emissions to determine if the projected emissions from a facility result in onshore ambient air concentrations above BOEM significance levels and to identify appropriate emissions controls to mitigate potential onshore air quality degradation.

Emissions data for new or modified onshore facilities directly associated with proposed OCS activities are required to be included in development plans submitted to BOEM so that affected States can determine potential air quality impacts on their air quality.

BOEM uses a two-level hierarchy of evaluation criteria to evaluate potential impacts of offshore emission sources to onshore areas. The evaluation criteria are the exemption level and the significance level. If the proposed activities exceed the criteria at the first (exemption) level, the evaluation moves to the significance level criteria. The initial evaluation compares the worst-case emissions to BOEM's exemption criteria. This corresponds to the USEPA screening step, where the proposed activity emissions are checked against the screening thresholds or "exemption levels." If the proposed activity emissions are below the exemption levels, then the proposed action is exempt from further air quality review.

If exemption levels are exceeded, then the second step requires refined modeling using the Offshore and Coastal Dispersion (OCD) Model. The results from the OCD Model, the modeled potential onshore impacts, are compared with BOEM significance levels. If the significance levels are exceeded in an attainment area, an area that meets the NAAQS, the operator would be required to apply best available control technology to the emissions source. If the affected area is classified as nonattainment, further emission reductions or offsets may be required. Projected contributions to onshore pollutant concentrations are also subject to the same increments as USEPA applies to the onshore areas under their Prevention of Significant Deterioration program.

Flaring/Venting

Flaring is the controlled burning of natural gas, and venting is releasing gas directly into the atmosphere without burning. Flaring/venting may be necessary to remove potentially damaging completion fluids from the wellbore and to provide sufficient reservoir data for the operator to evaluate reservoir development options during unloading/testing operations and/or in emergency situations. The BSEE regulates flaring/venting to minimize the loss of revenue producing natural gas resources. The BSEE regulations (30 CFR 250) allow, without prior BSEE approval, flaring or venting of natural gas on a limited basis under certain specified conditions. Regulations permit more extensive flaring/venting with prior approval from BSEE. Records must always be prepared by the operator for all flaring/venting, and justification must be provided for flaring/venting not expressly authorized by BSEE regulations. The NTL 2012-BSEE-N04 provides guidance for requesting approval to flare or vent natural gas and clarification on the discretionary authority of BSEE for approving such requests.

Hydrogen Sulfide Contingency Plans

The operator of a lease must request a BSEE area classification for the presence of hydrogen sulfide (H_2S) gas. The BSEE classifies areas for proposed operations as (1) H_2S absent, (2) H_2S present, or (3) H_2S unknown.

All OCS operators must provide information about potential contact with sour hydrocarbons (contains H_2S) that could result in atmospheric H_2S concentrations above 20 parts per million in their exploration or development plan. If an area is known to contain H_2S or is in an area where H_2S potential is unknown, operators are required to file an H_2S contingency plan with BSEE. This plan must include the 30 CFR 250 requirements that are intended to ensure workers' safety at the production facility and provide contingencies for simultaneous drilling, well-completion, well-workovers, and production operations. The NTL 2009-G31, "Hydrogen Sulfide (H_2S) Requirements," provides clarification, guidance, and information regarding BSEE's H_2S regulations at 30 CFR 250.

Archaeological Resources Regulation

Bottom-disturbing operations such as well placement, anchoring, and pipelaying activities can lead to damage to resources located on and below the seabed, including archaeological resources such as historic shipwrecks. The archaeological resources regulations at 30 CFR 250.194 and 550.194 grant authority in certain cases to each BOEM and BSEE Regional Director to require that archaeological reports be submitted with the EP, DOCD, or development and production plan (DPP) where deemed necessary. The technical requirements of the archaeological resource reports are detailed in NTL 2005-G07, "Archaeological Resource Surveys and Reports." If the evidence from the operator's geophysical survey and/or archaeological report suggests that an archaeological resource may be present, the lessee must either locate the site of any operation so as not to adversely affect the area where the archaeological resource may be, demonstrate that an archaeological resource does not exist, or demonstrate that archaeological resources will not be adversely affected by operations. If the lessee discovers any archaeological resource while conducting approved operations, operations must be immediately stopped and the discovery reported to BOEM's Regional Supervisor, Office of Environment, within 48 hours of its discovery.

High-resolution surveys, where required, provide an effective tool that analysts use to identify and help protect archaeological resources; however, such survey coverage is often not available for all areas of the GOM, particularly in deeper water, where oil and gas activities are increasing and where more shipwrecks are being identified. As part of the environmental reviews conducted for postlease activities, available information will be evaluated regarding the potential presence of archaeological resources within a proposed action area to determine if mitigation is warranted.

Coastal Zone Management Consistency Review and Appeals for Plans

The Coastal Zone Management Act (CZMA) places requirements on any applicant for an OCS plan that describes in detail Federal license or permit activities affecting any coastal use or resource, in or outside of a State's coastal zone. The applicant must provide in the OCS plan submitted to BOEM a consistency certification and necessary data and information for the State to determine that the proposed activities comply with the enforceable policies of the State's coastal management program (CMP), approved by the National Oceanic and Atmospheric Administration (NOAA), and that such activities will be fully consistent with those enforceable policies (16 U.S.C. 1456(c)(3)(A) and 15 CFR 930.76).

Except as provided in 15 CFR 930.60(a), State agency consistency review begins when the State receives the OCS plan, consistency certification, and necessary data and information pursuant to 15 CFR 930.76(a) and (b). Only missing information can be used to delay the commencement of State agency review, and a request for information and data that are not required by 15 CFR 930.76 will not extend the date of commencement of review (15 CFR 930.58). The information requirements for CZM purposes are found at 30 CFR 550.226 and 250.260 and are discussed in NTL 2007- G20, "Coastal Zone Management Program Requirements for OCS Right-of-Way Pipeline Applications"; NTL 2008-G04, "Information Requirements for Exploration Plans and Development Operations Coordination Documents"; NTL 2009- G27, "Submitting Exploration Plans and Development Operations Coordination Documents"; NTL 2010- N06, "Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS"; NTL 2010-N10, "Statement of

Compliance with Applicable Regulations and Evaluation of Information Demonstrating Adequate Spill Response and Well Containment Resources"; and NTL 2012-BSEE-N06, "Guidance to Owners and Operators of Offshore Facilities Seaward of the Coast Line Concerning Regional Oil Spill Response Plans."

All of the Gulf States have approved CMP's. Requirements for the CZM consistency information for Texas, Louisiana, Mississippi, Alabama, and Florida are given in NTL's 2007-G20, 2008-G04, 2009-G27, 2010-N06, and NTL 2012-BSEE-N06. In accordance with the requirements of 15 CFR 930.76, BOEM's Gulf of Mexico OCS Region sends copies of an OCS plan, including the consistency certification and other necessary data and information, to the designated State CMP agency. If no State-agency objection is submitted by the end of the consistency review period, BOEM shall presume consistency concurrence by the State (15 CFR 930.78(b)). BOEM can require modification of an operator's or lessee's plan in order to promote consistency.

If BOEM receives a written consistency objection from the State, BOEM will not approve any activity described in the OCS plan unless (1) the operator amends the OCS plan to accommodate the objection, concurrence is subsequently received or conclusively presumed; (2) upon appeal, the Secretary of Commerce, in accordance with 15 CFR 930 Subpart H, finds that the OCS plan is consistent with the objectives or purposes of the CZMA or is necessary in the interest of national security; or (3) the original objection is declared invalid by the courts.

Best Available and Safest Technologies

To assure that oil and gas exploration, development, and production activities on the OCS are conducted in a safe and environmentally sensitive manner, 43 U.S.C. § 1347(b) of the OCSLA, as amended, requires that all OCS technologies and operations use the best available and safest technology (BAST) whenever practical. The Director may require additional technological measures to protect safety, health, and the environment, if it is economically feasible and the benefits outweigh the costs. Conformance to the standards, codes, and practices referenced in or required under the authority of 30 CFR 250 is considered the application of BAST. These standards, codes, and practices include requirements for state-of-the-art drilling technology, production safety systems, oil and gas well completions, oil-spill response plans, pollution-control equipment, and specifications for platform/structure designs. The BSEE conducts periodic offshore inspections and continuously and systematically reviews OCS technologies to ensure that the best available and safest technologies are applied to OCS operations. The BAST is not required when BSEE determines that the incremental benefits are clearly insufficient to justify increased costs; however, it is the responsibility of an operator of an existing operation to demonstrate why application of a new technology would not be feasible. The BAST requirement is applicable to equipment and procedures that, upon failure, would have a significant effect on safety, health, or the environment, unless in BSEE's determination the benefits clearly do not justify the cost (30 CFR 250.107(c) and (d)).

The BAST concept is addressed in BSEE's Gulf of Mexico OCS Region by a continuous effort to locate and evaluate the latest technologies and to report on these advances at periodic Regional Operations Technology Assessment Committee (ROTAC) meetings. A part of BSEE's staff has an ongoing function to evaluate various vendors and industry representatives' innovations and improvements in techniques, tools, equipment, procedures, and technologies applicable to oil and gas operations (drilling, producing, completion, and workover operations). This information is provided to BSEE district personnel at ROTAC meetings. The requirement for the use of BAST has been, for the most part, an evolutionary process whereby advances in equipment, technologies, and procedures have been integrated into OCS operations over a period of time. The OCS operators have implemented the most advanced equipment and technologies into their day-to-day operations, and BSEE's inspectors have kept up with these advances. An example of such an equipment change that evolved over a period of time is the upgrading of diverter systems on drilling rigs from the smaller diameter systems of the past to the large-diameter, high-capacity systems found on drilling rigs operating on the OCS today.

Production Facilities

The BSEE regulations governing oil and gas production safety systems are found in 30 CFR 250 Subpart H. Production safety equipment used on the OCS must be designed, installed, used, maintained,

and tested in a manner to assure the safety and protection of the human, marine, and coastal environments. All tubing installations open to hydrocarbon-bearing zones below the surface must be equipped with safety devices that will shut off the flow from the well in the event of an emergency, unless the well is incapable of flowing. Surface- and subsurface-controlled safety valves and locks must conform to the requirements of 30 CFR 250.801. All surface production facilities, including separator and treatment tanks, compressors, headers, and flowlines must be designed, installed, and maintained in a manner that provides for efficiency, safety of operations, and protection of the environment. Production facilities also have stringent requirements concerning electrical systems, flowlines, engines, and firefighting systems. The safety-system devices are tested by the lessee at specified intervals and must be in accordance with API RP 14 C Appendix D and other measures.

Personnel Training and Education

An important factor in ensuring that offshore oil and gas operations are carried out in a manner that emphasizes operational safety and minimizes the risk of environmental damage is the proper training of personnel. Under 30 CFR 250.1500 Subpart O, BSEE has outlined well control and production safety training program requirements for lessees operating on the OCS. The goal of the regulation (30 CFR 250.1501) is safe and clean OCS operations. Lessees must ensure that their employees and contract personnel engaged in well control or production safety operations understand and can properly perform their duties. To accomplish this, the lessee must establish and implement a training program so that all of its employees are trained to competently perform their assigned well control and production safety duties. The lessee must also verify that its employees understand and can perform the assigned duties.

The mandatory Drilling Well-Control Training Program was instituted by this Agency in 1979. In 1983, the mandatory Safety Device Training Program was established to ensure that personnel involved in installing, inspecting, testing, and maintaining safety devices are qualified. As a preventive measure, all offshore personnel must be trained to operate oil-spill cleanup equipment, or the lessee must retain a trained contractor(s) to operate the equipment for them. In addition, BSEE offers numerous technical seminars to ensure that personnel are capable of performing their duties and are incorporating the most up-to-date safety procedures and technology in the petroleum industry. In 1994, the Office of Safety Management created this Agency's Offshore Training Institute to develop and implement an inspector training program. The Institute introduced state-of-the-art multimedia training to the inspector work force and has produced a series of interactive computer training modules.

Structure Removal and Site Clearance

During exploration, development, and production operations, temporary and permanent equipment and structures are often required to be embedded into or placed onto the seafloor around activity areas. In compliance with Section 22 of BOEM's Oil and Gas Lease Form (BOEM-2005) and OCSLA regulations (30 CFR 250.1710—*Permanently Plugging Wells* and 30 CFR 250.1725—*Removing Platforms and Other Facilities*), operators need to remove seafloor obstructions from their leases within 1 year of lease termination or after a structure has been deemed obsolete or unusable. These regulations also require the operator to sever bottom-founded objects and their related components at least 5 m (15 ft) below the mudline (30 CFR 250.1716(a)—*Wellheads/Casings* and 30 CFR 250.1728(a)—*Removing Platforms and Other Facilities*). The severance operations are generally categorized as explosive or nonexplosive.

Chapter 3.1.1.10 of the 2012-2017 WPA/CPA Multisale EIS describes in detail the regulations, reporting guidelines, and specific mitigation measures developed through consultation, pursuant to Section 7 of the Endangered Species Act (ESA) and the Marine Mammal Protection Act, concerning potential impacts on endangered and threatened species associated with explosive severance activities conducted during the structure-removal operations. All of the current terms and conditions of structure and well removal activities are outlined in NTL 2010-G05, "Decommissioning Guidance for Wells and Platforms."

Marine Protected Species NTL's

Three NTL's advise operators of measures designed to reduce impacts to Marine Protected Species: NTL 2012-JOINT-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program"; NTL 2012-BSEE-G01, "Marine Trash and Debris Awareness and Elimination"; and

NTL 2012-JOINT-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting." The provisions outlined in these NTL's apply to all existing and future oil and gas operations in the Gulf of Mexico OCS.

The NTL 2012-JOINT-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program," provides guidance to protect marine mammals and sea turtles during seismic operations. This NTL clarifies how operators should implement seismic survey mitigation measures, including ramp-up procedures, the use of a minimum sound source, airgun testing, and protected species observation and reporting. The measures contained in this NTL apply to all on-lease surveys conducted under 30 CFR 550 and to all off-lease surveys conducted under 30 CFR 551.

The NTL 2012-BSEE-G01, "Marine Trash and Debris Awareness and Elimination," provides guidance to prevent intentional and/or accidental introduction of debris into the marine environment. Operators are prohibited from deliberately discharging containers and other similar materials (i.e., trash and debris) into the marine environment (30 CFR 250.300(a) and (b)(6)) and are also required to make durable identification markings on equipment, tools, containers (especially drums), and other material (30 CFR 250.300(c)). The intentional jettisoning of trash has been the subject of strict laws such as the International Convention for the Prevention of Pollution from Ships (MARPOL) Annex V and the Marine Plastic Pollution Research and Control Act, and regulations imposed by various agencies including USCG and USEPA. These USCG and USEPA regulations require that operators become more proactive in avoiding accidental loss of solid-waste items by developing waste management plans, posting informational placards, manifesting trash sent to shore, and using special precautions such as covering outside trash bins to prevent accidental loss of solid waste. The NTL 2012-BSEE-G01 states marine debris placards must be posted in prominent places on all fixed and floating production facilities that have sleeping or food preparation capabilities and on mobile drilling units. Operators must also ensure that all of their offshore employees and those contractors actively engaged in their offshore operations complete annual training that includes (1) viewing a training video or slide show (specific options are outlined in the NTL) and (2) receiving an explanation from the lessee company's management that emphasizes their commitment to the NTL's provisions. An annual report that describes the marine trash and debris awareness training process and certifies that the training process has been followed for the previous calendar year is to be provided to BSEE by January 31 of each year.

The NTL 2012-JOINT-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting," explains how operators must implement measures to minimize the risk of vessel strikes to protected species and report observations of injured or dead protected species. Vessel operators and crews must maintain a vigilant watch for marine protected species and slow down or stop their vessel to avoid striking protected species. Crews must report sightings of any injured or dead protected species (marine mammals and sea turtles) immediately, regardless of whether the injury or death is caused by their vessel, to the Marine Mammal and Sea Turtle Stranding Hotline or the Marine Mammal Stranding Network. In addition, if it was the operator's vessel that collided with a protected species, BSEE must be notified within 24 hours of the strike.

Rigs-to-Reefs

Rigs-to-Reefs (RTR) is a term for converting obsolete, nonproductive offshore oil and gas platforms to designated artificial reefs (Dauterive, 2000). Disposal of obsolete offshore oil and gas platforms is not only a financial liability for the oil and gas industry but it can be a loss of productive marine habitat. The use of obsolete oil and gas platforms for reefs has proven to be highly successful. Their availability, design profile, durability, and stability provide a number of advantages over the use of traditional artificial reef materials. To capture this valuable fish habitat, the States of Florida, Louisiana, Alabama, Texas, and Mississippi in 1982, 1986, 1987, 1989, and 1999, respectively, passed enabling legislation and signed into law a RTR program to coincide with their respective States' Artificial Reef Plan. (Alabama and Florida have no RTR legislation.) The State laws set up a mechanism to transfer ownership and liability of the platform from oil and gas companies to the State when the platform ceases production and the lease is terminated. The company (donor) saves money by donating a platform to the State (recipient) for a reef rather than scrapping the platform onshore. The industry then donates 50 percent of the savings to the State, which is put toward the State's artificial reef program. Since the inception of the RTR program, more than 400 retired platforms have been donated and used as reefs in the Gulf of Mexico.

1.6. OTHER OCS-RELATED ACTIVITIES

BOEM and BSEE have programs and activities that are OCS-related but not specific to the oil and gas leasing process or to the management of exploration, development, and production activities. These programs include both environmental and technical studies, and cooperative agreements with other Federal and State agencies for NEPA work, joint jurisdiction over cooperative efforts, inspection activities, and regulatory enforcement. BOEM also participates in industry research efforts and forums.

Environmental Studies Program

The Environmental Studies Program (ESP) was established in 1973 in accordance with Section 20 of the OCSLA. The goals of the ESP are to obtain environmental and socioeconomic information that can be used to assess the potential and real effects of the Gulf of Mexico OCS natural gas and oil program, renewable or alternative energy programs, and sand program. As a part of the ESP, the Gulf of Mexico OCS Region has funded more than 875 completed or ongoing environmental studies. The types of studies funded include the following:

- literature reviews and baseline studies of the physical, chemical, and biological environment of the shelf;
- literature review and studies of the physical, chemical, and biological environment of deep water >300 m (1,000 ft);
- studies of the socioeconomic impacts along the Gulf Coast; and
- studies of the effects of oil and gas activities, renewable or alternative energy activities, and sand activities on the marine environment.

A list of the Gulf of Mexico OCS Region's studies published from 2006 to the present is presented in Appendix H of the 2012-2017 WPA/CPA Multisale EIS. Studies completed since 1974 are available on BOEM's Gulf of Mexico OCS Region's Internet website under "Environmental Stewardship, Environmental Studies." BOEM's Environmental Studies Program Information System (ESPIS) provides immediate access to all completed BOEM studies. The ESPIS is a searchable, web-based, full-text retrieval system allowing users to view online or to download the complete text of any completed ESP report. A complete list of all ongoing Gulf of Mexico OCS Region studies is available on BOEM's Internet website. Each listing not only describes the research being conducted but also shows the institution performing the work, the cost of the effort, timeframe, and any associated publications, presentations, or affiliated websites.

The ESP funds studies to obtain information needed for NEPA assessment and the management of environmental and socioeconomic impacts on the human, marine, and coastal environments that may be affected by OCS oil and gas activities, renewable or alternative energy activities, and sand activities. The ESP studies were used by BOEM's Gulf of Mexico OCS Region analysts to prepare this document. While not all of the Gulf of Mexico OCS Region's studies are specifically referenced in this document, they were used by analysts as input into their analyses. The information in ESP studies is also used by decisionmakers to manage and regulate exploration, development, and production activities on the OCS.

Technology Assessment & Research Program

The Technology Assessment & Research (TA&R) Program supports research associated with operational safety and pollution prevention as well as oil-spill response and cleanup capabilities. The TA&R Program is comprised of two functional research activities: (1) operational safety and engineering research (topics such as air quality, decommissioning, and mooring and anchoring); and (2) oil-spill research (topics such as behavior of oil, chemical treating agents, and in situ burning of oil). The TA&R Program has four primary objectives:

- Technical Support—Providing engineering support in evaluating industry operational proposals and related technical issues and in ensuring that these proposals comply with applicable regulations, rules, and operational guidelines and standards.
- Technology Assessment—Investigating and assessing industry applications of technological innovations and ensuring that governing BSEE regulations, rules, and operational guidelines ensure the use of BAST (Chapter 1.5 ["New and Unusual Technology"] and Chapter 3.1.1.9.3 of the 2012-2017 WPA/CPA Multisale EIS).
- Research Catalyst—Promoting and participating in industry research initiatives in the fields of operational safety, engineering research, and oil-spill response and cleanup research.
- International Regulations—Supporting international cooperative efforts for research and development initiatives to enhance the safety of offshore oil and natural gas activities and the development of appropriate regulatory program elements worldwide.

Interagency Agreements

Memoranda of Understanding under NEPA

Section 1500.5(b) of the CEQ implementing regulations (40 CFR 1500.5(b)) encourages agency cooperation early in the NEPA process. A Federal agency can be a lead, joint lead, or cooperating agency. A lead agency manages the NEPA process and is responsible for the preparation of an EIS; a joint lead agency shares these responsibilities; and a cooperating agency that has jurisdiction by law and has special expertise with respect to any environmental issue shall participate in the NEPA process upon the request of the lead agency.

When an agency becomes a Cooperating Agency, the cooperating and lead agencies usually enter into a Memorandum of Understanding (MOU), previously called a Cooperating Agency Agreement. The MOU details the responsibilities of each participating agency. BOEM, as lead agency, has requested other Federal agencies to become cooperating agencies while other agencies have requested BOEM to become a cooperating agency (e.g., the Ocean Express Pipeline project). Some projects, such as major gas pipelines across Federal waters and projects under the Deepwater Port Act of 1974, can require cooperative efforts by multiple Federal and State agencies.

The NOI 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. Consultation and coordination activities for this Supplemental EIS are described in **Chapter 5**.

Memorandum of Understanding and Memoranda of Agreements between BOEM/BSEE and USCG

Since BSEE and USCG have closely related jurisdiction over different aspects of safety and operations on the OCS, the agencies have established a formal MOU that delineates lead responsibilities for managing OCS activities in accordance with the OCSLA, as amended, and the Oil Pollution Act of 1990. The latest MOU, dated September 30, 2004, supersedes the August 1989 and December 1998 versions of the interagency agreement. The MOU is designed to minimize duplication and promote consistent regulation of facilities under the jurisdiction of both agencies. A Memorandum of Agreement (MOA), OCS No. 1—Agency Responsibilities, between BSEE and USCG, dated September 30, 2004, further clarifies the technical and process section of the BSEE/USCG Memorandum of Understanding. The MOA requires the participating agencies to review their internal procedures and, where appropriate, revise them to accommodate the provisions of the September 2004 MOA. To facilitate coordination with USCG, BSEE has established a full-time position within the Office of Offshore Regulatory Programs to provide liaison between the agencies.

Generally, the MOU identifies BSEE as the lead agency for matters concerning the equipment and operations directly involved in the production of oil and gas. These include, among others, design and operation of risers, permanent mooring foundations of the facility, drilling and well production and services, inspection and testing of all drilling-related equipment, and platform decommissioning. Issues

regarding certain aspects of safe operation of the facility, its systems, and equipment generally fall under the jurisdiction of USCG. These include, among others, design of vessels, their sea-keeping characteristics, propulsion and dynamic positioning systems, supply and lightering procedures and equipment, utility systems, safety equipment and procedures, and pollution prevention and response procedures. In 2002, this Agency was authorized to inspect USCG-related safety items on fixed facilities on the OCS.

Generally, the MOA identifies agency responsibilities (i.e., agency representatives for the purpose of keeping each other informed of issues, relevant applications, routine policy determinations and to coordinate joint activities), civil penalties (i.e., USCG refers civil penalty cases to BSEE), oil-spill financial responsibility (i.e., BSEE determines and provides oil-spill financial responsibility-related information to USCG upon request), oil-spill preparedness and response planning (i.e., BSEE requires responsible parties to maintain approved oil-spill-response plans consistent with Area Contingency Plans and the National Contingency Plan), oil-spill response (i.e., reporting all spills to the National Response Center and direct measures to abate sources of pollution from an OCS facility), accident investigations (i.e., BSEE and USCG responsible for investigating and preparing report of fires, spillage, injury, fatality and blowouts and collisions and allisions), and offshore facility system/subsystem responsibility matrix (identifies lead agency responsible for mobile offshore drilling unit (MODU), fixed, and floating systems and subsystems, and coordinates with other agencies as appropriate).

On April 18, 2005, this Agency and USCG met to identify MOA's that needed to be developed and to prioritize work. The following subject areas were selected: (a) civil penalties; (b) incident investigations; (c) offshore security; (d) oil-spill planning, preparedness, and response; (e) deepwater ports; (f) digital databases; (g) MODU's; (h) fixed platforms; (i) floating platforms; (j) floating, production, storage, and offloading units (FPSO's); and (k) incident reporting. Joint agency teams have been established to develop the MOA's for the first five subject areas. In addition, an MOA is also being pursued to address renewable energy and alternate uses for existing oil and gas platforms on the OCS. The Civil Penalties MOA-OCS-02 was approved on September 12, 2006. The Floating Offshore Facilities MOA OCS-04 was signed on February 28, 2008. The Oil Discharge Planning, Preparedness, and Response MOA-OCS-03 became effective on April 3, 2012, and the Incident Investigation MOA-OCS-03 became effective on April 3, 2012.

CHAPTER 2

ALTERNATIVES INCLUDING THE PROPOSED ACTIONS

2. ALTERNATIVES INCLUDING THE PROPOSED ACTIONS

This Supplemental EIS addresses one oil and gas lease sale in the WPA and one oil and gas lease sale in the CPA of the Gulf of Mexico OCS (Figure 1-1 of the 2012-2017 WPA/CPA Multisale EIS), as scheduled in the current *Proposed Final Outer Continental Shelf Oil & Gas Leasing Program: 2012-2017* (Five-Year Program; USDOI, BOEM, 2012a). The two proposed actions that are evaluated in this Supplemental EIS are proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231. The proposed actions (proposed lease sales) include compliance with applicable regulations in place at the time a ROD is made for each proposed action and lease stipulations.

2.1. SUPPLEMENTAL EIS NEPA ANALYSIS

Proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231 were analyzed in the 2012-2017 WPA/CPA Multisale EIS. This Supplemental EIS tiers from the 2012-2017 WPA/CPA Multisale EIS, and it summarizes and hereby incorporates the material by reference. Each of the proposed lease sales is expected to be within the scenario ranges summarized in **Chapter 3** of this Supplemental EIS and as discussed in Chapter 3 of the 2012-2017 WPA/CPA Multisale EIS. The WPA and CPA proposed actions include existing regulations and lease stipulations.

This Supplemental EIS is the final NEPA review conducted for proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231. The analysis is focused on addressing the new issue(s) and/or concern(s) that have been identified since publication of the 2012-2017 WPA/CPA Multisale EIS. The analysis of new impacts and new information identified since publication of the 2012-2017 WPA/CPA Multisale EIS, along with an updated discussion of associated BOEM coordination and consultations, is addressed.

The purpose of this Supplemental EIS is to determine if new information is available, if it would alter the conclusions stated in the 2012-2017 WPA/CPA Multisale EIS and, if so, to disclose those changes. BOEM utilized the best information available derived from ongoing and past research to determine if the baseline condition for resources had changed since publication of the 2012-2017 WPA/CPA Multisale EIS. This Supplemental EIS presents an impartial analysis of new information that is available through sources open to BOEM experts.

This Supplemental EIS analyzes the potential impacts of the WPA and CPA proposed actions on sensitive coastal environments, offshore marine resources, and socioeconomic resources both onshore and offshore.

2.2. ALTERNATIVES, MITIGATING MEASURES, AND ISSUES

2.2.1. Alternatives

The alternatives to be considered for proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231 are detailed below. 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 and previous EIS's, numerous issues and topics were identified for consideration. During the scoping period for the 2012-2017 WPA/CPA Multisale EIS, a number of alternatives or deferral options were suggested and examined for inclusion in that EIS (Chapter 2.2.3.2 of the 2012-2017 WPA/CPA Multisale EIS). 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 2012-2017 WPA/CPA Multisale EIS that these alternatives or deferral options are not 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 2012-2017 WPA/CPA Multisale EIS.

2.2.1.1. Alternatives for Proposed Western Planning Area Lease Sale 233

Alternative A—The Proposed Action: This is BOEM's preferred alternative. This alternative would offer for lease all unleased blocks within the proposed WPA lease sale area (**Figure 2-1**), with the following exception:

(1) whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary (i.e., the boundary as of the publication of this Supplemental EIS).

Alternative A of the 2012-2017 WPA/CPA Multisale EIS also included an exclusion of whole and partial blocks that lie within the 1.4-nmi buffer zone north of the maritime boundary between the United States and Mexico. The U.S. and Mexico have been pursuing an Agreement to govern the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico. On February 20, 2012, the "Agreement between the United States of America and the United Mexican States Concerning Transboundary Hydrocarbon Reservoirs in the Gulf of Mexico" (Agreement) was signed by representatives of each Government, but it has not yet entered into force. Upon its entry into force, the blocks and acreage in this buffer zone that were not offered in past lease sales will become available for leasing. As the Agreement may enter into force prior to the tentative date scheduled to hold proposed WPA Lease Sale 233, BOEM has considered this 1.4-nmi buffer area as being potentially available for lease under Alternative A.

Although the leasing of portions of the WPA and CPA (subareas or blocks) can be deferred during a Five-Year Program, DOI is conservative throughout the NEPA process and includes the total area within the Gulf of Mexico planning areas for environmental evaluation.

The proposed WPA lease sale area encompasses about 28.58 million ac. As of March 2013, approximately 20.7 million ac of the proposed WPA lease sale area are currently unleased. The estimated amount of resources projected to be developed as a result of the proposed WPA lease sale is 0.116-0.200 BBO and 0.538-0.938 Tcf of gas (**Table 3-1**).

Alternative B—The Proposed Action Excluding the Unleased Blocks Near Biologically Sensitive Topographic Features: This alternative would offer for lease all unleased blocks within the proposed WPA lease sale area, as described for the proposed action (Alternative A), with the exception of any unleased blocks subject to the Topographic Features Stipulation. The estimated amount of resources projected to be developed is 0.116-0.200 BBO and 0.538-0.938 Tcf of gas (refer to **Chapter 2.3.2** for further details).

Alternative C—No Action: This alternative is the cancellation of proposed WPA Lease Sale 233. If this alternative is chosen, the opportunity for development of the estimated 0.116-0.200 BBO and 0.538-0.938 Tcf of gas that could have resulted from proposed WPA Lease Sale 233 would be precluded or postponed to a future WPA lease sale. Any potential environmental impacts resulting from proposed WPA Lease Sale 233 would not occur or would be postponed to a future lease sale decision. This 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 2.2.1.1 of the 2012-2017 WPA/CPA Multisale EIS includes a detailed description of alternatives considered, but not analyzed in this 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 carrying these alternatives and deferrals through detailed analyses in this Supplemental EIS are the same as those used in the 2012-2017 WPA/CPA Multisale EIS, and BOEM has identified no new information that changes these conclusions.

2.2.1.2. Alternatives for Proposed Central Planning Area Lease Sale 231

Alternative A—The Proposed Action: This is BOEM's preferred alternative. This alternative would offer for lease all unleased blocks within the proposed CPA lease sale area (**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.

Alternative A of the 2012-2017 WPA/CPA Multisale EIS also included an exclusion of whole and partial blocks that lie within the 1.4-nmi buffer zone north of the maritime boundary between the United States and Mexico. The U.S. and Mexico have been pursuing an agreement to govern the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico. On February 20, 2012, the Agreement was signed by representatives of each Government, but it has not yet entered into force. Upon its entry into force, the blocks and acreage in this buffer zone that were not offered in past lease sales will become available for lease. As the Agreement may enter into force prior to the tentative date scheduled to hold proposed CPA Lease Sale 231, BOEM has considered this 1.4-nmi buffer area as being potentially available for lease under Alternative A.

Although the leasing of portions of the CPA (subareas or blocks) can be deferred during a Five-Year Program, DOI is conservative throughout the NEPA process and includes the total area within the Gulf of Mexico planning areas for environmental evaluation.

The proposed CPA lease sale area encompasses about 63 million ac of the total CPA area of 66.45 million ac. As of March 2013, approximately 43.0 million ac of the proposed CPA lease sale area are currently unleased. The estimated amount of resources projected to be developed as a result of proposed CPA Lease Sale 233 is 0.460-0.894 BBO and 1.939-3.903 Tcf of gas (**Table 3-1**).

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), with the exception of any unleased blocks subject to the Topographic Features Stipulation. The estimated amount of resources projected to be developed is 0.116-0.200 BBO and 0.538-0.938 Tcf of gas (refer to **Chapter 2.4.2** for further details).

Alternative C—No Action: This alternative is the cancellation of proposed CPA Lease Sale 231. 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 proposed CPA Lease Sale 231 would be precluded or postponed to a future WPA lease sale. Any potential environmental impacts resulting from proposed CPA Lease Sale 233 would not occur or would be postponed to a future lease sale decision. This 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 description of alternatives considered, but not analyzed in this 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 carrying these alternatives and deferrals through detailed analyses in this Supplemental EIS are the same as those used in the 2012-2017 WPA/CPA Multisale EIS and BOEM has identified no new information that changes these conclusions.

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 the alternative chosen relevant and reasonable mitigation measures that could improve the action. The CEQ regulations (40 CFR 1508.20) define mitigation as

- 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 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. Five lease stipulations (described in **Chapter 2.3.1.3** of this Supplemental EIS and in Chapter 2.3.1.3 of the 2012-2017 WPA/CPA Multisale EIS) are proposed for WPA Lease Sale 233—the Topographic Features Stipulation, the Military Areas Stipulation, the Protected Species Stipulation, the Law of the Sea Convention Royalty Payment Stipulation, and the Transboundary Stipulation. Ten lease stipulations (described in **Chapter 2.4.1.3** of this Supplemental EIS and in Chapter 2.4.1.3 of the 2012-2017 WPA/CPA Multisale EIS) are proposed for CPA Lease Sale 231—the Topographic Features Stipulation; the Live Bottom (Pinnacle Trend) Stipulation; the Military Areas Stipulation; the Evacuation Stipulation; the Coordination Stipulation; the Blocks South of Baldwin County, Alabama, Stipulation; the Protected Species Stipulation; the Law of the Sea Convention Royalty Payment Stipulation; the Below Seabed Operations Stipulation; and the Transboundary Stipulation. The Law of the Sea Convention Royalty Payment Stipulation is applicable to the proposed WPA and CPA lease sales 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 lease sales 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 stipulations or mitigation requirements to be included in the proposed WPA and CPA lease sales 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 the lease sales, will undergo a NEPA review, and additional project-specific mitigations applied as conditions of plan approval. The BSEE has the authority to monitor and enforce these conditions, and under 30 CFR 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

This section discusses mitigating measures that may be applied to the proposed actions. 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 exploration, development, and production activities. All plans for OCS 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 the operations are always 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 and avoidance of

archaeological sites and biologically sensitive areas such as pinnacles, topographic features, and chemosynthetic communities.

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 NMFS's Observer Program to protect marine mammals and sea turtles during explosive removals, labeling operational supplies to track possible sources of debris or equipment loss, development of methods of pipeline landfall to eliminate impacts to beaches or wetlands, and 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 the following:

- air quality;
- archaeological resources;
- artificial reef material;
- chemosynthetic communities;
- Flower Garden Banks;
- topographic features;
- hard bottoms/pinnacles;
- 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 the following:

- advisories;
- conditions of approval;
- hazard survey reviews;
- inspection requirements;
- notifications;
- post-approval submittals;
- and safety precautions.

In addition to standard mitigations, BOEM may also apply nonrecurring mitigating measures that are developed on a case-by-case basis.

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 by CEQ to represent those principal "effects" that an EIS should evaluate in-depth. Scoping identifies specific environmental resources and/or activities rather than "causes" as significant issues (CEQ Guidance on Scoping, April 30, 1981). The analysis in the EIS can then show the degree of change from the present conditions for each issue to the actions related to a proposed action.

Selection of environmental and socioeconomic issues to be analyzed was based on the following criteria:

- the issue as identified in CEQ regulations is subject to evaluation;
- the relevant resource/activity was identified through agency expertise, through the scoping process, or from comments on past EIS's;
- 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 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-related support services, activities, and infrastructure, socio-cultural and socioeconomic, and OCS oil and gas infrastructure). **Chapters 4.1 and 4.2** of this 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
- Alabama, Choctawhatchee, St. Andrew, and Perdido Key Beach Mice
- Archaeological Resources (Historic and Prehistoric)
- 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
- 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 have been covered by prior environmental review. No additional issues were identified during scoping that are not addressed in this Supplemental EIS. Comments received during scoping are summarized in **Chapter 5.3**.

2.3. PROPOSED WESTERN PLANNING AREA LEASE SALE 233

2.3.1. Alternative A—The Proposed Action (Preferred Alternative)

2.3.1.1. Description

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

(1) whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary (i.e., the boundary as of the publication of this Supplemental EIS).

Alternative A of the 2012-2017 WPA/CPA Multisale EIS also included an exclusion of whole and partial blocks that lie within the 1.4-nmi buffer zone north of the maritime boundary between the United States and Mexico. The U.S. and Mexico have been pursuing an Agreement to govern the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico. On February 20, 2012, the Agreement was signed by representatives of each Government, but it has not yet entered into force. Upon its entry into force, the blocks and acreage in this buffer zone that were not offered in past lease sales will become available for lease. As the Agreement may enter into force prior to the tentative date scheduled to hold proposed WPA Lease Sale 233, BOEM has considered this 1.4-nmi buffer area as being potentially available for lease under Alternative A.

Although the leasing of portions of the WPA (subareas or blocks) can be deferred during a Five-Year Program, DOI is conservative throughout the NEPA process and includes the total area within the Gulf of Mexico for environmental evaluation.

The proposed WPA lease sale area encompasses about 28.58 million ac. As of March 2013, approximately 20.7 million ac of the proposed WPA lease sale area are currently unleased. The estimated amount of resources projected to be developed as a result of proposed WPA Lease Sale 233 is 0.116-0.200 BBO and 0.538-0.938 Tcf of gas.

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 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 Record of Decision.

2.3.1.2. Summary of Impacts

A search by subject-matter experts was conducted for each resource to consider new information made available since publication of the 2012-2017 WPA/CPA Multisale EIS and to consider new information on the *Deepwater Horizon* explosion, oil spill, and cleanup. Any new information discovered was analyzed by subject-matter experts to determine if the impact conclusions presented in the 2012-2017 WPA/CPA Multisale EIS were altered as a result of the new information.

For the following resources, the subject-matter experts determined that there was no new information made available since publication of the 2012-2017 WPA/CPA Multisale EIS that was relevant to potential impacts from the WPA proposed action; therefore, the impact conclusions for these resources remain the same as those that were presented in the 2012-2017 WPA/CPA Multisale EIS. These impact conclusions are presented in **Chapter 4.1.1** of this Supplemental EIS. For ease of review, the individual chapter numbers for each resource are provided in the following list.

- Coastal Barrier Beaches and Associated Dunes (**Chapter 4.1.1.3**)
- Wetlands (**Chapter 4.1.1.4**)
- Seagrass Communities (**Chapter 4.1.1.5**)
- Topographic Features (**Chapter 4.1.1.6**)

- *Sargassum* Communities (**Chapter 4.1.1.7**)
- Chemosynthetic Deepwater Benthic Communities (**Chapter 4.1.1.8**)
- Nonchemosynthetic Deepwater Benthic Communities (**Chapter 4.1.1.9**)
- Soft Bottom Benthic Communities (**Chapter 4.1.1.10**)
- Diamondback Terrapins (**Chapter 4.1.1.13**)
- Fish Resources and Essential Fish Habitat (**Chapter 4.1.1.15**)
- Species Considered due to U.S. Fish and Wildlife Service Concerns (**Chapter 4.1.1.21**)

For the following resources, the subject-matter experts determined that there was new information made available since publication of the 2012-2017 WPA/CPA Multisale EIS that was relevant to potential impacts from the WPA 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 enough to alter any of the impact conclusions presented in the 2012-2017 WPA/CPA Multisale EIS. These impact conclusions are presented in **Chapter 4.1.1** of this Supplemental EIS. 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 Waters) (**Chapters 4.1.1.2.1 and 4.1.1.2.2**, respectively)
- Marine Mammals (**Chapter 4.1.1.11**)
- Sea Turtles (**Chapter 4.1.1.12**)
- Coastal and Marine Birds (**Chapter 4.1.1.14**)
- Commercial Fisheries (**Chapter 4.1.1.16**)
- Recreational Fishing (**Chapter 4.1.1.17**)
- Recreational Resources (**Chapter 4.1.1.18**)
- Archaeological Resources (Historic and Prehistoric) (**Chapters 4.1.1.19.1 and 4.1.1.19.2**, respectively)
- Human Resources and Land Use (Land Use and Coastal Infrastructure, Demographics, Economic Factors, and Environmental Justice) (**Chapters 4.1.1.20.1, 4.1.1.20.2, 4.1.1.20.3, and 4.1.1.20.4**, respectively)

In summary, no new significant information was discovered that would alter the impact conclusions for any of the resources analyzed in the 2012-2017 WPA/CPA Multisale EIS. The analyses and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233. BOEM also evaluated whether the potential addition of the 1.4-nmi buffer area that may become available for leasing if the Agreement enters into force would alter the impact conclusions for any of the resources analyzed. Due to the small number of lease blocks in the area, the distance of this area from many resources, and the fact that the buffer area is similar to and adjacent to blocks that were already considered in the 2012-2017 WPA/CPA Multisale EIS, BOEM has determined that the potential addition of this area does not affect the impact conclusions in the 2012-2017 WPA/CPA Multisale EIS.

The potential impacts of a low-probability, catastrophic oil spill, such as the one that resulted from the *Deepwater Horizon* explosion and oil spill, to the environmental and cultural resources and the socioeconomic conditions analyzed in the 2012-2017 WPA/CPA Multisale EIS are addressed in the "Catastrophic Spill Event Analysis" (Appendix B of the 2012-2017 WPA/CPA Multisale EIS). The reader is referred to Appendix B of the 2012-2017 WPA/CPA Multisale EIS for the analysis of the potential effects of a catastrophic event for each resource. BOEM reviewed relevant information

available since publication of the 2012-2017 WPA/CPA Multisale EIS and, where relevant, summarized this information in **Chapter 4.1.1** of this Supplemental EIS. BOEM's subject-matter experts determined that none of the newly available information was of a relevance to necessitate revisions to Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Therefore, none of the newly available information significantly changed the analyses or conclusions regarding catastrophic events. BOEM's analyses and conclusions of catastrophic events in Appendix B of the 2012-2017 WPA/CPA Multisale EIS remain unchanged; therefore, BOEM refers the reader to Appendix B of the 2012-2017 WPA/CPA Multisale EIS for the analysis of the potential effects of a catastrophic event for each resource.

2.3.1.3. Mitigating Measures

2.3.1.3.1. Topographic Features Stipulation

The topographic features located in the WPA and CPA provide habitat for coral-reef-community organisms (**Chapters 4.1.1.6 and 4.2.1.7**, respectively). These communities could be severely and adversely impacted by oil and gas activities resulting from the proposed action if such activities took place on or near these communities without the Topographic Features Stipulation and if such activities were not mitigated. The DOI has recognized this problem for some years, and since 1973 stipulations have been made a part of leases on or near these biotic communities so that impacts from nearby oil and gas activities were mitigated to the greatest extent possible. This stipulation would not prevent the recovery of oil and gas resources but would serve to protect valuable and sensitive biological resources.

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 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 highs in the GOM; numerous stipulation-imposed, industry-funded monitoring reports; and the National Research Council (NRC) report entitled *Drilling Discharges in the Marine Environment* (1983). The stipulation protects the biota of the banks from routine oil and gas activities resulting from the proposed action, while allowing the development of nearby oil and gas resources. The stipulation would not prevent adverse effects of an accident such as a large blowout on a nearby oil or gas operation from impacting the banks. 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 2.3.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.1.3.2. Military Areas Stipulation

The Military Areas Stipulation has been applied to all blocks leased in military areas since 1977 and reduces potential impacts, particularly in regards to safety; but, it 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 of the 2012-2017 WPA/CPA Multisale EIS 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.

2.3.1.3.3. 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 Department of Commerce, National Oceanic and Atmospheric Administration, NMFS and the 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.

2.3.1.3.4. Law of the Sea Convention Royalty Payment Stipulation

The Law of the Sea Convention Royalty Payment Stipulation applies to blocks or portions of blocks beyond the U.S. Exclusive Economic Zone (generally greater than 200 nmi [230 mi; 370 km] from the U.S. coastline). Leases on these blocks may be subject to special royalty payments under the provisions of the 1982 Law of the Sea Convention (consistent with Article 82), if the U.S. becomes a party to the Convention prior to or during the life of the lease. A more detailed discussion and definition of this stipulation and its effectiveness are found in Chapter 2.3.1.3.4 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.1.3.5. Transboundary Stipulation

The Agreement, once it enters into force, will make 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 applies 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. A more detailed discussion and definition of this stipulation and its effectiveness are found in Chapter 2.3.1.3.5 of the 2012-2017 WPA/CPA Multisale EIS.

2.3.2. Alternative B—The Proposed Action Excluding the Unleased Blocks Near the Biologically Sensitive Topographic Features

2.3.2.1. Description

Alternative B differs from Alternative A by not offering the blocks that are potentially subject to the proposed Topographic Features Stipulation (Chapter 2.3.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS and **Figure 2-1** of this Supplemental EIS). All of the assumptions (including the 4 other potential mitigating measures and the 1 stipulation) and estimates are the same as for Alternative A. A description of Alternative A is presented in **Chapter 2.3.1.1**.

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 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 oil and gas 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 essentially the same as those projected for the proposed action. As a result, the impacts expected to result from Alternative B would be very similar to those described under the WPA proposed action (**Chapter 4.1.1**). Therefore, the regional impact levels for all resources, except for the topographic features, would be similar to those described under the proposed action. This alternative, if adopted, would prevent any oil and gas activity whatsoever in the affected blocks; thus, it would eliminate any potential direct impacts to the biota of those blocks from oil and gas 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 proposed WPA Lease Sale 233. If this alternative is chosen, the opportunity for development of the estimated 0.116-0.200 BBO and 0.538-0.938 Tcf of gas that could have resulted from the proposed lease sale would be precluded or postponed to a future WPA lease sale.

The No Action alternative encompasses the same potential impacts as a decision to delay the proposed lease sale to a later scheduled lease sale under the Five-Year Program, when another decision on whether to hold that future lease sale is made. As the potential impacts are the same, namely that most impacts related to Alternative A would not occur as described below, delay of the proposed lease sale was not considered as a separate alternative from Alternative C. Any potential environmental impacts resulting from proposed WPA Lease Sale 233 would not occur or would be postponed to a future lease sale decision.

2.3.3.2. Summary of Impacts

Canceling proposed WPA Lease Sale 233 would eliminate the effects described for Alternative A (**Chapter 4.1.3**). The incremental contribution of the proposed lease sale to the cumulative effects would also be foregone, but the effects from other activities, including other OCS lease sales, would remain.

If proposed WPA Lease Sale 233 would be canceled, the resulting development of oil and gas would most likely be postponed to a future sale; therefore, the overall level of OCS activity in the WPA would only be reduced by a small percentage, if any. Therefore, the cancellation of the proposed lease sale would not significantly change the environmental impacts of overall OCS activity. However, the cancellation of the proposed lease sale may result in direct economic impacts to the individual companies. Revenues collected by the Federal Government (and thus revenue disbursements to the States) would be adversely affected also.

Other sources of energy may substitute for the lost production. Principal substitutes would be additional imports, conservation, additional domestic production, and switching to other fuels. These alternatives, except conservation, have significant negative environmental impacts of their own. For example, tankering of fuels from alternate sources over longer distances would also have significant potential negative impacts, including through the increased risk of spills.

2.4. PROPOSED CENTRAL PLANNING AREA LEASE SALE 231

2.4.1. Alternative A—The Proposed Action (Preferred Alternative)

2.4.1.1. Description

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

Alternative A of the 2012-2017 WPA/CPA Multisale EIS also included an exclusion of whole and partial blocks that lie within the 1.4-nmi buffer zone north of the maritime boundary between the United States and Mexico. The U.S. and Mexico have been pursuing an Agreement to govern the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico. On February 20, 2012, the Agreement was signed by representatives of each Government, but it has not yet entered into force. Upon its entry into force, the blocks and acreage in this buffer zone that were not offered in past lease sales will become available for lease. As the Agreement may enter into force prior to the tentative date scheduled to hold proposed CPA Lease Sale 231, BOEM has considered this 1.4-nmi buffer area as being potentially available for lease under Alternative A.

Although the leasing of portions of the CPA and WPA (subareas or blocks) can be deferred during a Five-Year Program, DOI is conservative throughout the NEPA process and includes the total area within the Gulf of Mexico for environmental evaluation.

The proposed CPA lease sale area encompasses about 63 million ac of the CPA's 66.45 million ac. As of March 2013, approximately 43.0 million ac of the proposed CPA lease sale area are currently

unleased. The estimated amount of resources projected to be developed as a result of proposed CPA Lease Sale 231 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 4.2.1** are based on the development scenario, which is a set of assumptions and estimates on the amounts, locations, and timing for OCS exploration, development, and production operations and facilities, both offshore and onshore. A detailed discussion of the development scenario and 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 Record of Decision.

2.4.1.2. Summary of Impacts

A search by subject-matter experts was conducted for each resource to consider new information made available since publication of the 2012-2017 WPA/CPA Multisale EIS and to consider new information on the *Deepwater Horizon* explosion, oil spill, and cleanup. Any new information discovered was analyzed by subject-matter experts to determine if the impact conclusions presented in the 2012-2017 WPA/CPA Multisale EIS were altered as a result of the new information.

For the following resources, the subject-matter experts determined that there was no new information made available since publication of the 2012-2017 WPA/CPA Multisale EIS that was 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 2012-2017 WPA/CPA Multisale EIS. These impact conclusions are presented in **Chapter 4.2.1** of this Supplemental EIS. For ease of review, the individual chapter numbers for each resource are provided in the following list:

- Seagrass Communities (**Chapter 4.2.1.5**)
- Live Bottoms (Pinnacle Trend and Low Relief) (**Chapters 4.2.1.6.1 and 4.2.1.6.2**, respectively)
- Topographic Features (**Chapter 4.2.1.7**)
- *Sargassum* Communities (**Chapter 4.2.1.8**)
- Chemosynthetic Deepwater Benthic Communities (**Chapter 4.2.1.9**)
- Nonchemosynthetic Deepwater Benthic Communities (**Chapter 4.2.1.10**)
- Soft Bottom Benthic Communities (**Chapter 4.1.1.11**)
- Gulf Sturgeon (**Chapter 4.2.1.17**)

For the following resources, the subject-matter experts determined that there was new information made available since publication of the 2012-2017 WPA/CPA Multisale EIS that was 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 enough to alter any of the impact conclusions presented in the 2012-2017 WPA/CPA Multisale EIS. These impact conclusions are presented in **Chapter 4.2.1** of this Supplemental EIS. For ease of review, the individual chapter numbers for each resource are provided in the following list.

- Air Quality (**Chapter 4.2.1.1**)
- Water Quality (Coastal and Offshore Waters) (**Chapters 4.2.1.2.1 and 4.2.1.2.1**, respectively)
- Coastal Barrier Beaches and Associated Dunes (**Chapter 4.2.1.3**)
- Wetlands (**Chapter 4.2.1.4**)
- Marine Mammals (**Chapter 4.2.1.12**)
- Sea Turtles (**Chapter 4.2.1.13**)

- Diamondback Terrapins (**Chapter 4.2.1.14**)
- Alabama, Choctawhatchee, St. Andrew, and Perdido Key Beach Mice (**Chapter 4.2.1.15**)
- Coastal and Marine Birds (**Chapter 4.2.1.16**)
- Fish Resources and Essential Fish Habitat (**Chapter 4.2.1.1.18**)
- Commercial Fisheries (**Chapter 4.2.1.19**)
- Recreational Fishing (**Chapter 4.2.1.20**)
- Recreational Resources (**Chapter 4.2.1.21**)
- Archaeological Resources (Historic and Prehistoric) (**Chapters 4.2.1.22.1 and 4.2.1.22.2**, respectively)
- Human Resources and Land Use (Land Use and Coastal Infrastructure, Demographics, Economic Factors, and Environmental Justice) (**Chapters 4.2.1.23.1, 4.2.1.23.2, 4.2.1.23.3, and 4.2.1.23.4**, respectively)
- Species Considered due to U.S. Fish and Wildlife Service Concerns (**Chapter 4.2.1.24**)

In summary, no new significant information was discovered that would alter the impact conclusions for any of the resources analyzed in the 2012-2017 WPA/CPA Multisale EIS. The analyses and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231. BOEM also evaluated whether the potential addition of the 1.4-nmi buffer area that may become available for leasing if the Agreement enters into force would alter the impact conclusions for any of the resources analyzed. Due to the small number of lease blocks in the area, the distance of this area from many resources, and the fact that the buffer area is similar to and adjacent to blocks that were already considered in the 2012-2017 WPA/CPA Multisale EIS, BOEM has determined that the potential addition of this area does not affect the impact conclusions in the 2012-2017 WPA/CPA Multisale EIS.

The potential impacts of a low-probability, catastrophic oil spill, such as the one that resulted from the *Deepwater Horizon* explosion and oil spill, to the environmental and cultural resources and the socioeconomic conditions analyzed in the 2012-2017 WPA/CPA Multisale EIS are addressed in the "Catastrophic Spill Event Analysis" (Appendix B of the 2012-2017 WPA/CPA Multisale EIS). The reader is referred to Appendix B of the 2012-2017 WPA/CPA Multisale EIS for the analysis of the potential effects of a catastrophic event for each resource. BOEM reviewed relevant information available since publication of the 2012-2017 WPA/CPA Multisale EIS and, where relevant, summarized this information in **Chapter 4.2.1** of this Supplemental EIS. BOEM's subject-matter experts determined that none of the newly available information was of a relevance to necessitate revisions to Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Therefore, none of the newly available information significantly changed the analyses or conclusions regarding catastrophic events. BOEM's analyses and conclusions of catastrophic events in Appendix B of the 2012-2017 WPA/CPA Multisale EIS remain unchanged; therefore, BOEM refers the reader to Appendix B of the 2012-2017 WPA/CPA Multisale EIS for the analysis of the potential effects of a catastrophic event for each resource.

2.4.1.3. Mitigating Measures

2.4.1.3.1. Topographic Features Stipulation

Refer to **Chapter 2.3.1.3.1** of this Supplemental EIS and to Chapter 2.4.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS for a complete description of this stipulation.

2.4.1.3.2. Live Bottom (Pinnacle Trend) Stipulation

The Live Bottom (Pinnacle Trend) Stipulation covers the pinnacle trend area of the CPA (**Figure 2-1**). 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 4.2.1.6**. 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. 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.

2.4.1.3.3. Military Areas Stipulation

Refer to **Chapter 2.3.1.3.2** of this Supplemental EIS and to Chapter 2.3.1.3.2 of the 2012-2017 WPA/CPA Multisale EIS for a complete description of this stipulation.

2.4.1.3.4. 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 proposed CPA Lease Sale 231. 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.

2.4.1.3.5. 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 proposed CPA Lease Sale 231. 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.

2.4.1.3.6. 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. 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.

2.4.1.3.7. Protected Species Stipulation

Refer to **Chapter 2.3.1.3.3** of this Supplemental EIS and to Chapter 2.3.1.3.3 of the 2012-2017 WPA/CPA Multisale EIS for a complete description of this stipulation.

2.4.1.3.8. Law of the Sea Convention Royalty Payment Stipulation

Refer to **Chapter 2.3.1.3.4** of this Supplemental EIS and to Chapter 2.3.1.3.4 of the 2012-2017 WPA/CPA Multisale EIS for a complete description of this stipulation.

2.4.1.3.9. Below Seabed Operations Stipulation

The Below Seabed Operations Stipulation language is intended to be 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.

2.4.1.3.10. Transboundary Stipulation

Refer to **Chapter 2.3.1.3.5** of this Supplemental EIS and to Chapter 2.3.1.3.5 of the 2012-2017 WPA/CPA Multisale EIS for a complete description of this stipulation.

2.4.2. Alternative B—The Proposed Action Excluding the Unleased Blocks Near the Biologically Sensitive Topographic Features

2.4.2.1. Description

Alternative B differs from Alternative A by not offering the blocks that are potentially subject to the proposed Topographic Features Stipulation (Chapter 2.4.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS and **Figure 2-1** of this Supplemental EIS). All of the assumptions (including the 9 other potential mitigating measures and the 1 stipulation) and estimates are the same as for Alternative A. A description of Alternative A is presented in **Chapter 2.4.1.1**.

2.4.2.2. Summary of Impacts

The analyses of impacts summarized in **Chapter 2.4.1.2** and described in detail in **Chapter 4.2.1** are based on the development scenario, which is a set of assumptions and estimates on the amounts, locations, and timing for OCS 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 oil and gas 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 essentially the same as those projected for the CPA proposed action. As a result, the impacts expected to result from Alternative B would be very similar to those described under the CPA proposed action (**Chapter 4.2.1**). Therefore, the 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 oil and gas activity in the affected blocks; thus, it would eliminate any potential direct impacts to the biota of those blocks.

2.4.3. Alternative C—No Action

2.4.3.1. Description

Alternative C is the cancellation of proposed CPA Lease Sale 231. 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 lease sale would be precluded or postponed to a future CPA lease sale. The No Action alternative encompasses the same potential impacts as a decision to delay the proposed lease sale to a later scheduled lease sale under the Five-Year Program, when another decision on whether to hold that future lease sale is made. As the potential impacts are the same, namely that most impacts related to Alternative A would not occur as described below, delay of the proposed lease sale was not considered as a separate alternative from Alternative C. Any potential environmental impacts resulting from proposed CPA Lease Sale 231 would not occur or would be postponed to a future lease sale decision.

2.4.3.2. Summary of Impacts

Canceling proposed CPA Lease Sale 231 would eliminate the effects described for Alternative A (**Chapter 4.2.3**). The incremental contribution of the proposed lease sale to the cumulative effects would also be avoided, but the effects from other activities, including other OCS lease sales, would remain.

If proposed CPA Lease Sale 231 would be canceled, the resulting development of oil and gas would most likely be postponed to a future sale; therefore, the overall level of OCS activity in the CPA would only be reduced by a small percentage. Therefore, the cancellation of the proposed lease sale would not significantly change the environmental impacts of overall OCS activity. However, the cancellation of the proposed lease sale may result in direct economic impacts to the individual companies. Revenues collected by the Federal Government (and thus revenue disbursements to the States) would be adversely affected as well.

Other sources of energy may substitute for the lost production. Principal substitutes would be additional imports, conservation, additional domestic production, and switching to other fuels. These alternatives, except conservation, have negative environmental impacts of their own. For example, tankering of fuels from alternate sources over longer distances would also have significant potential negative impacts, including through the increased risk of spills.

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 describes in detail the offshore infrastructure and activities (impact-producing factors) associated with the WPA and CPA proposed actions (i.e., a typical lease sale that would result from the proposed actions) within the WPA and CPA that could potentially affect the biological, physical, and socioeconomic resources of the Gulf of Mexico. In addition, Chapter 3.1.1 of the 2012-2017 WPA/CPA Multisale EIS also describes the OCS Program's cumulative activity scenario resulting from past and future lease sales in the WPA, CPA, and EPA that could potentially affect the biological, physical, and socioeconomic resources of the GOM within the WPA and CPA. Note that offshore and onshore impact-producing factors and scenarios associated with an Eastern Planning Area (EPA) proposed action, i.e., a typical lease sale that would result from the proposed actions within the EPA, as well as OCS Program activity resulting from past and future lease sales in the EPA will be disclosed in a subsequent Eastern Planning Area EIS within this Five-Year Program.

Offshore is defined, for the purposes of this Supplemental EIS, as the OCS portion of the GOM that begins 10 mi (16 km) offshore Florida; 3 nmi (3.5 mi; 5.6 km) offshore Louisiana, Mississippi, and Alabama; and 3 marine leagues (9 nmi; 10.36 mi; 16.67 km) offshore Texas; and it 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), the Exclusive Economic Zone (Figure 1-1 of the 2012-2017 WPA/CPA Multisale EIS). Coastal infrastructure and activities associated with the WPA and CPA proposed actions are described in **Chapter 3.1.2**.

BOEM projects that the overwhelming majority of the oil and natural gas fields discovered as a result of the WPA or CPA proposed action will reach the end of their economic life within a time span of 40 years following the 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, our forecasts indicate that the 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. The forecasts used to develop the proposed actions and OCS Program scenarios are based on resource estimates developed by this Agency in 2011, published data and information, and historical activity and discovery trends in the GOM.

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

- 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.

The WPA proposed lease sale represents 4-5 percent of the OCS Program in the WPA based on barrels of oil equivalent (BOE) resource estimates and 1 percent of the total OCS Program. The proposed CPA lease sale represents 3-4 percent of the OCS Program in the CPA (3% of the total OCS Program). Activities associated with the proposed actions are assumed to represent those same percentages of OCS Program activities unless otherwise indicated.

Specific projections for activities associated with the WPA and CPA proposed actions are discussed in the following scenario sections. The potential impacts of the activities associated with a proposed "typical" lease sale are considered in the environmental analysis sections (**Chapters 4.1.1 and 4.2.1**).

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 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 (**Chapters 4.1.1 and 4.2.1**).

3.1.1.1. Resource Estimates and Timetables

The proposed action and cumulative cases have not changed since last analyzed for the 2012-2017 WPA/CPA Multisale EIS. BOEM has not identified any new information or change in circumstances since publication of the 2012-2017 WPA/CPA Multisale EIS that would change the estimates and timetables.

3.1.1.1.1. Proposed Actions

The proposed actions 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 areas; 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. 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 oil and gas production anticipated from typical lease sales 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 the proposed actions and for the OCS Program. **Tables 3-2 and 3-3** provide a summary of the major scenario elements of the proposed actions and some of the related impact-producing factors. To analyze impact-producing factors for the proposed actions and the OCS Program, the proposed lease sale areas were divided into offshore subareas based upon ranges in water depth. **Figure 3-1** depicts the location of the offshore subareas. The water-depth ranges reflect 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 Scenarios (WPA and CPA Typical Sales): The estimated amounts of resources projected to be leased, discovered, developed, and produced as a result of a typical proposed WPA lease sale are 0.116-0.200 BBO and 0.538-0.938 Tcf of gas. 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. The impact-producing factors, affected environment, and environmental consequences related to proposed lease sales in the EPA will be disclosed and addressed in a subsequent Eastern Planning Area EIS within this Five-Year Program.

The number of exploration and delineation wells, production platforms, and development wells projected to develop and produce the estimated resources for a WPA and CPA proposed action are given in **Tables 3-2 and 3-3**, respectively. The tables show the distribution of these factors by offshore subareas in the proposed lease sale areas. **Tables 3-2 and 3-3** include estimates of the major impact-producing factors related to the projected levels of exploration, development, and production activity.

Exploratory drilling activity takes place over an 8-year period, beginning within 1 year after the lease sale. Development activity 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 begins by the third year after the lease sale and continues beyond the 40th year.

3.1.1.1.2. OCS Program

OCS Program Cumulative Scenario (WPA, CPA, and EPA): Projected reserve/resource production for the OCS Program is 18.335-25.64 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 3-4** presents all anticipated production from lands currently under lease in the WPA, CPA, and EPA plus all anticipated production 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 anticipated production from lands currently under lease in the WPA plus 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. **Table 3-5** presents 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.

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 anticipated production from lands currently under lease in the CPA plus 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 3-6** presents 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.

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 1 percent of the oil and >1 percent of the gas of the total Gulfwide OCS Program. The impact-producing factors, affected environment, and environmental consequences related to proposed lease sales within the EPA will be disclosed and addressed in a subsequent Eastern Planning Area EIS within this Five-Year Program.

3.1.1.2. Exploration and Delineation

3.1.1.2.1. Seismic Surveying Operations

Chapter 3.1.1.2.1 of the 2012-2017 WPA/CPA Multisale EIS describes in detail seismic survey operations including ocean-bottom surveys.

Prelease surveys are comprised of seismic work performed on or off leased areas, focused most commonly (but not always) on deeper targets and collectively authorized under BOEM's geological and geophysical permitting process. Postlease, high-resolution seismic surveys collect data on surficial or near-surface geology used to identify potential shallow geologic hazards for engineering and site planning for bottom-founded structures. Noise associated with OCS oil and gas development results from seismic surveys, the operation of fixed structures such as offshore platforms and drilling rigs, and helicopter and service-vessel traffic. These noise sources are discussed in **Chapter 3.1.1.6**.

Proposed Action Scenario (WPA, CPA, and EPA Typical Sales): Because of the cyclic nature in the acquisition of seismic surveys, a prelease seismic survey would be attributable to lease sales held up to 7-9 years after the survey. Based on historical trends in geological and geophysical (G&G) permitting

and industry input for the Gulf of Mexico, BOEM projects that the proposed actions, i.e., the proposed lease sales, would result in 29,197 OCS blocks surveyed by deep seismic operations for the years 2012-2017. For postlease seismic surveys, information obtained from high-resolution seismic contractors operating in the GOM project the proposed actions would result in about 50 vertical seismic profiling (VSP) operations and 629 high-resolution surveys covering approximately 226,400 line miles (364,420 km) of near-surface and shallow penetration seismic during the life of the proposed actions. The impact-producing factors, affected environment, and environmental consequences related to proposed lease sales in the EPA will be disclosed and addressed in a subsequent Eastern Planning Area EIS within this Five-Year Program.

OCS Program Cumulative Scenario: Seismic surveys are projected to follow the same trend as exploration activities, which peaked in 2008-2010, steadily decline until 2027, and 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 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.

During the first 5 years of the analysis period, BOEM projects annually there would be 50 VSP operations, 226,400 lines miles (364,420 km) surveyed by high-resolution seismic, and 29,197 blocks surveyed by deep seismic, including some areas that will be resurveyed. During the second half of the 40-year analysis period, it is projected annually there would be 5-10 VSP operations, 40,000 mi (64,374 km) surveyed by high-resolution seismic, and 4,000-5,000 blocks surveyed by deep seismic.

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.

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 appearing to be 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 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 MODU's; e.g., jack-up rigs, semisubmersible rigs, submersible, platform rigs, or drill ships. Non-MODU drilling units, such as inland barges, are also used. 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 availability and daily 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 Gulf of Mexico MODU's 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 Gulf 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 scenarios for the proposed actions assume that an average exploration well will require 30-45 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 3,674 m (12,055 ft) below mudline.

Subpart D of BSEE's regulations (30 CFR 250) specifies requirements for drilling activities. Refer to Chapter 1.3.1 and Table 1-2 of the 2012-2017 WPA/CPA Multisale EIS, which provide a summary of new safety requirements.

Tables 3-2 through 3-6 show the estimated range of exploration and delineation wells by water-depth range for the WPA and CPA typical sale cases; WPA, CPA, and EPA total OCS Program case; and WPA and CPA cumulative cases, respectively.

WPA Proposed Action Scenario (Typical Sale): BOEM estimates that 53-89 exploration and delineation wells would be drilled as a result of the WPA proposed action. **Table 3-2** shows the estimated range of exploration and delineation wells by water-depth range. Approximately 55 percent of the projected wells are expected to be on the continental shelf (0-200 m [0-656 ft] water depth), and a little less than 45 percent are expected in the intermediate water-depth ranges and deeper (>200 m; 656 ft).

CPA Proposed Action Scenario (Typical Sale): BOEM estimates that 168-329 exploration and delineation wells would be drilled as a result of the CPA proposed action. **Table 3-3** shows the estimated range of exploration and delineation wells by water-depth range. A little more than 50 percent of the projected wells for the CPA proposed action are expected to be on the continental shelf (0-200 m [0-656 ft] water depth), and slightly less than 50 percent are expected in intermediate water-depth ranges and deeper (>200 m; 656 ft).

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 past OCS lease sales and projected activity for future lease sales associated with this Five-Year Program. **Tables 3-4, 3-5, and 3-6** show the estimated range of exploration and delineation wells by water-depth range. 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). The impact-producing factors, affected environment, and environmental consequences related to lease sales within the EPA will be disclosed and addressed in a subsequent Eastern Planning Area EIS within this Five-Year Program.

Note that offshore and onshore impact-producing factors and scenarios associated with an EPA proposed action, i.e., a typical sale that would result from the proposed lease sales within the EPA, as well as OCS Program activity resulting from past and future lease sales in the EPA, will be disclosed in a subsequent Eastern Planning Area EIS within this Five-Year Program.

3.1.1.3. Development and Production

Chapter 3.1.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS describes in detail development and production drilling and development operations and coordination documents.

Delineation and production wells are sometimes collectively termed development wells. A development well is designed to extract resource from a known hydrocarbon reservoir. After a discovery, the operator must decide whether or not to complete the well without delay, to delay completion with the rig on station so that additional tests may be conducted, or to temporarily abandon the well site and move the rig off station to a new location and drill another well. Sometimes an operator will decide to drill a series of development wells, move off location, and then return with a rig to complete all the wells at one time. If an exploration well results in a dry hole, the operator permanently abandons the well without delay.

When the decision is made to complete the well, a new stage of activity begins. Completing a well involves preparing the well for production. BOEM estimates that approximately 90 percent of development wells will become producing wells. The typical process includes setting and cementing the production casing, installing some downhole production equipment, perforating the casing and surrounding cement, treating the formation, setting a gravel pack (if needed), and installing production tubing. One form of formation treatment is known as "fracking." Fracking involves pressurizing the well to force chemicals or mechanical agents into the formation. Mechanical agents, such as sand or small microspheres (tiny glass beads), can be used to prop open the created factures that act as conduits to deliver hydrocarbons to the wellbore. Well treatment chemicals are commonly used to improve well productivity. For example, acidizing a reservoir to dissolve cementing agents and improve fluid flow is the most common well treatment in the GOM. After a production test determines the desired production rate to avoid damaging the reservoir, the well is ready to go online and produce.

The chief planning document that lays out an operator's specific intentions for development is the DOCD. The range of postlease development plans is discussed in **Chapter 1.5**. **Table 3-2** shows the estimated range of development wells and production structures by water depth subarea for the WPA proposed action.

WPA Proposed Action Scenario (Typical Sale): BOEM estimates that 77-121 development and production wells would be drilled as a result of the WPA proposed action. **Table 3-2** shows the estimated range of development and production wells by water-depth subarea. Approximately 55 percent of the projected wells are expected to be on the continental shelf (0-200 m [656 ft] water depth) and 45-47 percent are expected in intermediate water-depth ranges and deeper (>200 m; 656 ft). Trends between the oil and gas development wells are markedly different. For oil wells (27-40), the intermediate water-depth ranges and deeper (200 m; 1,600 m) has the largest portion of projected oil wells, 55-60 percent. The percent of oil wells in the other water-depth categories ranges from around 7 to 15 percent. For gas wells (36-62), the continental shelf (0-200 m [0-656 ft] water depth) has the largest portion of projected gas wells, about 80 percent. The percent of gas wells in the other water-depth categories is much less and ranges from 3 to 6 percent.

CPA Proposed Action Scenario (Typical Sale): It is estimated that 215-417 development and production wells will be drilled as a result of the CPA proposed action. **Table 3-3** 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).

OCS Program Cumulative Scenario (WPA, CPA, and EPA): It is estimated that 8,530-12,180 development and production wells will be drilled in the WPA, CPA, and EPA as a result of the proposed lease sales and all OCS activity associated with previous lease sales. **Tables 3-4, 3-5, and 3-6** show the estimated range of development wells by water depth.

Note that offshore and onshore impact-producing factors and scenarios associated with an EPA proposed action, i.e., a typical sale that would result from the proposed lease sales within the EPA, as well as OCS Program activity resulting from past and future lease sales in the EPA, will be disclosed in a subsequent Eastern Planning Area EIS within this Five-Year Program.

Chapter 3.1.1.3.2 of the 2012-2017 WPA/CPA Multisale EIS describes in detail infrastructure emplacement/structure installation and commissioning activities.

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.

WPA Proposed Action Scenario (Typical Sale): It is estimated that 15-23 production structures will be installed as a result of the WPA proposed action. **Table 3-2** shows the projected number of structure installations for the WPA proposed action by water-depth range. About 67-74 percent of the production structures installed for the WPA proposed action are projected to be on the continental shelf (0-60 m; 0-197 ft).

CPA Proposed Action Scenario (Typical Sale): It is estimated that 35-67 production structures will be installed as a result of the CPA proposed action. **Table 3-3** 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).

OCS Program Cumulative Scenario (WPA, CPA, and EPA): It is estimated that 1,435-2,026 production structures would be installed in the WPA, CPA, and EPA as a result of the proposed lease sales and all OCS activity associated with previous lease sales. More than 90 percent of all the production structures installed for the CPA proposed action in are projected to be on the continental shelf (0-200 m; 0-656 ft). **Tables 3-4, 3-5, and 3-6** show the projected number of structure installations by water-depth range for the OCS Program.

Note that offshore and onshore impact-producing factors and scenarios associated with an EPA proposed action, i.e., a typical sale that would result from the proposed lease sales within the EPA, as well

as OCS Program activity resulting from past and future lease sales in the EPA, will be disclosed in a subsequent Eastern Planning Area EIS within this Five-Year Program.

Chapter 3.1.1.3.2.1 of the 2012-2017 WPA/CPA Multisale EIS describes in detail bottom area disturbances. Structures emplaced or anchored on the OCS to facilitate oil and gas exploration and production include drilling rigs or MODU's (jack-ups, semisubmersibles, and drillships), pipelines, and fixed surface, floating, and subsea production systems are described in Chapters 3.1.1.3.1 and 3.1.1.3.2 of the 2012-2017 WPA/CPA Multisale 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 its 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.

Chapter 3.1.1.3.2.2 of the 2012-2017 WPA/CPA Multisale EIS describes in detail sediment displacement. 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 eventually settle, covering the surrounding seafloor. Resuspended sediments may include entrained heavy metals or hydrocarbons.

Chapter 3.1.1.3.3 of the 2012-2017 WPA/CPA Multisale EIS describes in detail impact-producing factors due to infrastructure presence. Impacts due to installation and maintenance of infrastructure include 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

Chapter 3.1.1.4 of the 2012-2017 WPA/CPA Multisale EIS describes impacting factors due to operational wastes discharged offshore. 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.

However, it should be noted that regulations regarding discharges from vessels are becoming increasingly stringent. The USCG Ballast Water Management Program became mandatory for some vessels in 2004 (33 CFR 151 Subparts C and D) (USDHS, CG, 2012). The goal of the program was designed to prevent the introduction of nonindigenous (invasive) species that would affect local water quality. The USCG amended its regulations on ballast water management by establishing a standard for the allowable concentration of living organisms in ballast water discharged from ships in waters of the U.S. and by establishing an approval process for ballast water management systems. The final rule was published on March 23, 2012, in the *Federal Register* and became effective on June 21, 2012 (USDHS, CG, 2012). The final Vessel General Permit (VGP), issued by USEPA, became effective on December 19, 2008, and was an addition to already existing National Pollutant Discharge Elimination System (NPDES) permit requirements. The permit increased the NPDES regulations so that discharges incidental to the normal operation of vessels operating as a means of transportation were no longer excluded unless exempted by Congressional legislation. The 2013 draft VGP would continue to regulate 26 specific discharge categories that were contained in the 2008 VGP, and it is more stringent because the permit contains numeric ballast water discharge limits for most vessels and more stringent effluent limits for oil-to-sea interfaces and exhaust gas scrubber washwater (USEPA, 2011). The draft Small Vessel General Permit (sVGP), if finalized, would authorize discharges incidental to the normal operation of nonmilitary and nonrecreational vessels less than 79 ft (24 m) in length (USEPA, 2011). At this time, a Congressional moratorium exempts all incidental discharges, with the exception of ballast water, from commercial fishing vessels and nonrecreational, nonmilitary vessels less than 79 ft (24 m) in length. However, the Congressional moratorium expires on December 18, 2013, at which time the sVGP would provide coverage for those vessels (USEPA, 2011).

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 and the Secretary of the Interior, USEPA assumed air quality responsibility for the OCS waters east of 87.5° W. longitude, and this Agency retained NAAQS air quality jurisdiction for OCS operations west of 87.5° W. longitude in the GOM.

Air pollutants are emitted from the OCS emission sources that include any equipment that combusts a fuel, transports and/or transfers hydrocarbons, or results in accidental releases of petroleum hydrocarbons or chemicals, causing air emissions of pollutants. Some of these pollutants are precursors to ozone, which is formed by complex photochemical reactions in the atmosphere. Air pollutants are generated during exploration and production activities when fuels are combusted to run drilling equipment, power generators, and run engines. During production, fugitive emissions, including volatile organic compounds, escape from valves and flanges. The NAAQS criteria pollutants are generated along routes from shore bases to OCS leases by vessels transporting supplies and workers.

The NAAQS air pollutants are also released during both venting and flaring. A combustion flare or cold vent is a specially designed boom or stack used to dispose of hydrocarbon vapors or natural gas. Unlike cold vents, the hydrocarbons are ignited during flaring. Flares can be used routinely to control emissions as part of unloading/testing operations that are necessary to remove potentially damaging completion fluids from the wellbore and to provide sufficient reservoir data for the operator to evaluate a reservoir and development options; they can also be used during emergency process upsets. The BSEE regulations provide for some limited volume, short duration (2-14 days, typically) flaring or venting of oil and natural gas upon approval by BSEE. Through 30 CFR 250.1105, BSEE may allow operators to burn liquid hydrocarbons if they can demonstrate that transporting them to market or re-injecting them into the formation is not technically feasible or poses a significant risk of harm to the environment.

3.1.1.6. Noise

Noise associated with OCS oil and gas development results from seismic surveys, the operation of fixed structures such as offshore platforms and drilling rigs, and helicopter and service-vessel traffic. Noise generated from these activities can be transmitted through both air and water, and may be extended or transient. Offshore drilling and production involves various activities that produce a composite

underwater noise field. The intensity level and frequency of the noise emissions are highly variable, both between and among the various industry sources. Noise from proposed OCS activities may affect resources near the activities. Whether a sound is or is not detected by marine organisms would depend 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. Extreme levels of noise can cause physical damage or death to an exposed animal; intense levels can damage hearing; and loud or novel sounds may induce disruptive behavior or other responses of lesser importance. Chapter 3.1.1.6 of the 2012-2017 WPA/CPA Multisale EIS describes in detail noise impact-producing factors associated with OCS oil and gas development.

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. 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 describes in detail the following information related to oil spills:

- trends in reported spill volumes and numbers;
- projections of future spill events;
- OCS-related offshore oil spills;
- non-OCS-related offshore spills;
- OCS-related coastal spills;
- non-OCS-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 transportation of equipment and personnel. Chapter 3.1.1.8 of the 2012-2017 WPA/CPA Multisale EIS describes in detail sources of offshore transport and proposed action scenarios, including the following:

- pipelines (installation and maintenance; landfalls);
- barges;
- oil tankers;
- service vessels; and
- helicopters.

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 in Chapters 3.1.1.9.1 and 3.1.1.9.2 of the 2012-2017 WPA/CPA Multisale EIS. 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 to the platform/facilities (piles, jackets, caissons, templates, mooring devises, etc.) or the well (i.e., wellheads, casings, casing stubs, etc.). Decommissioning and removal operations, including WPA and CPA proposed action scenarios 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

Chapter 3.1.2.1 of the 2012-2017 WPA/CPA Multisale EIS discusses coastal impact-producing factors and provides scenario projections for onshore coastal infrastructure that may potentially result from a single WPA or CPA proposed action in the 2012-2017 Five-Year Program. This discussion describes the potential need for new facility construction and expansions of existing ones. Detailed descriptions of the baseline affected environment for land use and coastal infrastructure in the WPA and CPA are provided in Chapters 4.1.1.1.20.1.1 and 4.2.1.1.23.1.1 of the 2012-2017 WPA/CPA Multisale EIS.

Oil and gas exploration, production, and development activities on the OCS are supported by an expansive onshore infrastructure industry that includes large and small companies providing a wealth of services from construction facilities, service bases, and waste disposal facilities to crew, supply, and product transportation, as well as processing facilities. The oil and gas industry supports thousands of jobs; its direct and indirect economic impacts ripple through the Gulf Coast economy. The OCS-related infrastructure is a longstanding feature of these regional economies. This infrastructure has been developed over many decades, and it is an extensive and mature system that provides support for offshore activities.

The extensive presence of this coastal infrastructure is the result of long-term industry trends. Its presence is not subject to rapid fluctuations. In this context, the potential for new facilities and expansion at existing facilities depends foremost on the OCS activity levels, which have been somewhat depressed since the *Deepwater Horizon* explosion and oil spill and the subsequent drilling suspensions. The scenario projections outlined below reflect the already well-established industrial infrastructure in the GOM regions and reduced OCS activity levels. Chapter 3.1.2.1 of the 2012-2017 WPA/CPA Multisale EIS describes in detail coastal impact-producing factors from the following coastal infrastructure:

- service bases;
- helicopter hubs;
- construction facilities;
- processing facilities;
- terminals;
- coastal pipelines;
- coastal barging; and
- navigation channels.

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. These coastal discharges and wastes include 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.

3.2. IMPACT-PRODUCING FACTORS AND SCENARIO—ACCIDENTAL EVENTS

3.2.1. Oil Spills

Oil spills are unplanned; accidental events and their frequency and volume can only be estimated from past occurrences. The following sections discuss spill prevention and spill response, and analyze the risk of spills that could occur as a result of activities associated with the WPA or CPA proposed action. Public input through scoping meetings and Federal and State agencies' input through consultation and coordination indicate that oil spills are perceived to be a major issue, especially in the wake of the *Deepwater Horizon* oil spill. The following section analyzes the risk of spills that could occur as a result of a typical WPA or CPA proposed action, as well as information on the number and sizes of spills from non-OCS sources. Refer to Appendix B of the 2012-2017 WPA/CPA Multisale EIS for the "Catastrophic Spill Event Analysis."

3.2.1.1. Spill Prevention

Beginning in the 1980's, this Agency established comprehensive pollution-prevention requirements that include redundant safety systems, as well as inspection and testing requirements to confirm that these devices are working properly (**Chapter 1.5**). Until the *Deepwater Horizon* oil spill, an overall reduction in spill volume had occurred during the previous 40 years, while oil production had generally increased. A characterization of spill rates, average and median volumes from 1995 to 2009 compared with 1996-2010 (latest analysis available), 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 its operational requirements, ongoing efforts by the oil and gas industry to enhance safety and pollution prevention, and the evolution and improvement of offshore technology. No spills >50 barrels (bbl) were recorded for 2011, and no data are currently available for 2012 (USDOI, BSEE, 2012a); therefore, Anderson et al. (2012), which was utilized in the 2012-2017 WPA/CPA Multisale EIS and in this Supplemental EIS, is still the latest analysis available for the characterization of spill rates and for average and median volumes.

3.2.1.2. Past OCS Spills

BOEM's spill-event database includes records of past spills from activities that BOEM regulates. 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. No spills >50 bbl were recorded for 2011, and no data are currently available for 2012 (USDOI, BSEE, 2012a); therefore, Anderson et al. (2012), which was utilized in the 2012-2017 WPA/CPA Multisale EIS and in this Supplemental EIS, is still the latest analysis available for the characterization of spill rates and for average and median volumes.

Spills occur in coastal waters at shoreline storage, processing, and transport facilities supporting the OCS oil and gas industry. Coastal spills occur in State offshore waters and in navigation channels, rivers, and bays from barges and pipelines carrying OCS-produced oil.

Chapter 3.2.1.2 of the 2012-2017 WPA/CPA Multisale EIS describes in detail past OCS spills, including coastal and offshore spills.

3.2.1.3. Characteristics of OCS Oil

The physical and chemical properties of oil greatly affect its transport and fate. These physical and chemical properties 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.

Table 3-7 summaries the properties and persistence of different types of oils. The American Petroleum Industry (API) gravity is a measurement of the density of the oil. The density of oil determines whether it will sink or float, or whether it will collect sediment (heavier oils tend to collect sediment) and sink. As well, the density of oil is one of the key factors in predicting whether spilled oil will entrain water and form emulsions.

Extensive laboratory testing has been performed on various oils from the GOM to determine their physical and chemical characteristics. There are currently 39 different oils collected from the Gulf of Mexico (U.S. waters) in Environment Canada's (2011) oil properties database. For each of these oils, the details of their chemical composition include hydrocarbon groups (i.e., saturates, aromatics, resins, asphaltenes), volatile organic compounds (VOC's) (such as benzene, toluene, ethylbenzene, and xylene), sulfur content, biomarkers, and metals. Light sweet crude oil (such as from the *Deepwater Horizon* oil spill) is preferred by refineries and is referred to as "sweet" because of its low sulfur content. The composition of oil will change substantially following release during an oil spill, due to weathering processes such as evaporation. The API gravities for the oils identified in the Environment Canada (2011) database range from 16.4° to 50.2°. This is similar to the range identified in an Agency-funded study of 22.8° to 58.6° API for data from 67 plays (Trudel et al., 2001).

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. Estimated information includes 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. This section of the EIS addresses the likelihood of spill occurrence, the transportation of oil slicks by winds and waves, and the probability of an oil spill contacting sensitive environmental resources. Sensitivity of the environmental resources and potential effects are addressed in the analyses for the specific resources of concern (**Chapters 4.1 and 4.2**).

BOEM uses data on past OCS production and spills, along with estimates of future production, to evaluate the risk of future spills. Data on the numbers, types, sizes, and other information on past spills were reviewed to develop the spill scenario for analysis in this Supplemental EIS. The spill scenario provides (1) the set of assumptions for and estimates of future spills, (2) the rationale for the scenario assumptions and estimates, and (3) the type, frequency, quantity, and fate of the spilled oil for specific scenarios. The spill scenario accounts for spill response and cleanup activities and the estimated time that the spill remains floating on the water.

BOEM uses a numerical model to calculate the likely trajectory of spills and analyzes the historical database to make other oil-spill projections. Estimates are based on historical spills and do not consider the effect of the recent retirement of older platforms and pipelines in preventing spills. A description of the trajectory model, called the OSRA (oil-spill risk analysis) model, and its results are published as a separate report (Ji et al., 2012). The OSRA model results as presented and discussed in the 2012-2017

WPA/CPA Multisale EIS are still applicable for this Supplemental EIS because 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. For a complete description of the OSRA model, refer to Chapter 3.2.1.4 of the 2012-2017 WPA/CPA Multisale EIS. The OSRA model simulates thousands of spills launched throughout the Gulf of Mexico OCS and calculates the probability of these spills being transported and contacting specified environmental resources. The OSRA modeling results in a numerical expression of risk based on spill rates, projected oil production, and trajectory modeling. The OSRA modeling does not include the effects of weathering and thus provides a conservative estimate of risk assessment. A discussion of weathering based on past analyses will be included in the following sections.

The following discussion provides separate risk information for offshore spills ≥1,000 bbl, offshore spills <1,000 bbl, and coastal spills that may result from the WPA or CPA proposed action. Only spills ≥1,000 bbl are addressed using OSRA because smaller spills may not persist long enough to be simulated by trajectory modeling. Another consideration is that these large spills are likely to be identified and reported; therefore, these records are more comprehensive than those of smaller spills.

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 addresses the risk of spills ≥1,000 bbl that could occur from accidents associated with activities resulting from the WPA or CPA proposed action. The risk analyses addressed include 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.

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 addresses the risk of spills <1,000 bbl resulting from the WPA or CPA proposed action. Analysis of historical data shows that most offshore OCS oil spills have been ≤1 bbl (Anderson et al., 2012). Although spills of ≤1 bbl have made up 96 percent of all OCS-related spill occurrences, spills of this size have contributed very little (2%) to the total volume of OCS oil that has been spilled. Most of the total volume of OCS oil spilled (95%) has been from spills ≥10 bbl. The risk analyses addressed in Chapter 3.2.1.6 of the 2012-2017 WPA/CPA Multisale EIS include 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.

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 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.

3.2.1.8. Risk Analysis by Resource

BOEM analyzed risk to resources from oil spills and oil slicks that could occur as a result of the WPA or CPA proposed action. The risk results are 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 are described in more detail in the preceding spill scenarios. For offshore spills, combined probabilities were calculated using the OSRA model, which includes both the likelihood of a spill from a 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 **Chapters 4.1.1 and 4.2.1** of this Supplemental EIS and in Figures 3-8 through 3-28 of the 2012-2017 WPA/CPA Multisale EIS. Coastal spills are estimated from historic counts; the estimate is not a rate tied to an anticipated production volume or a probability. Chapter 3.2.1.8 of the 2012-2017 WPA/CPA Multisale EIS provides a detailed discussion of the risk analysis by resource from offshore oil spills.

3.2.1.9. Spill Response

Chapter 3.2.1.9 of the 2012-2017 WPA/CPA Multisale EIS describes in detail offshore spill response. Issues discussed related to spill response include the following:

- BOEM's spill-response requirements and initiatives;
- offshore response, containment, and cleanup technology;
- oil-spill-response assumptions used in the analysis of a most likely spill ≥1,000 bbl incident related to a proposed action; and
- onshore response and cleanup.

As a result of the Oil Pollution Act of 1990, BSEE was tasked with a number of oil-spill-response duties and planning requirements. These requirements are implemented according to BSEE's regulations at 30 CFR 250 and 254:

- requires immediate notification for spills >1 bbl—all spills require notification to USCG, and BOEM receives notification from the USCG of all spills ≤1 bbl;
- conducts investigations to determine the cause of a spill;
- assesses civil and criminal penalties, if needed;
- oversee spill source control and abatement operations by industry;
- sets requirements and reviews and approves oil-spill-response plans for offshore facilities;

- conducts unannounced drills to ensure compliance with oil-spill-response plans;
- 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.

This Agency also issued NTL's and guidance documents that clarify additional oil-spill requirements after the *Deepwater Horizon* explosion, oil spill, and cleanup occurred. The spill-response-related NTL's and guidance documents issued by this Agency and BSEE are described in detail in Chapter 3.2.1.9 of the 2012-2017 WPA/CPA Multisale EIS.

One spill-response-related NTL has been issued since the publication of the 2012-2017 WPA/CPA Multisale EIS, and it is described below.

NTL 2012-BSEE-N06, "Guidance to Owners and Operators of Offshore Facilities Seaward of the Coast Line Concerning Regional Oil Spill Response Plans"

This NTL, effective 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. This NTL also informs the lessees, designated operators, or pipeline right-of-way holders, as appropriate, that they are responsible for preparing and submitting the OSRP. The BSEE's Oil Spill Response Division will review and approve OSRP's that are in compliance with 30 CFR 254. Some of the clarifications and encouraged practices in this NTL are based on lessons learned from the *Deepwater Horizon* explosion, oil spill, and cleanup. Adherence to the encouraged practices will facilitate BSEE's review of the OSRP's, but it is not required to obtain approval. During BSEE's review of regional OSRP's, the Oil Spill Response Division will analyze the content to ensure that the lessees demonstrate the ability to respond quickly and effectively whenever oil is discharged from a covered facility as required by 30 CFR 254. The NTL encourages the lessees to specifically describe the planned response strategy for each worst-case discharge scenario included in the regional OSRP. The following factors should be considered when developing a response strategy:

- location of the potential worst-case discharge;
- proximity to sensitive resources;
- nature of the event;
- estimated discharge volume;
- oil characteristics;
- appropriate source control;
- containment methods;
- weathering (including natural dispersion); and
- other resources at risk.

3.2.2. Losses of Well Control

All losses of well control must be reported to BSEE. The BSEE clarified its procedure for loss of well control incident reporting in NTL 2010-N05, "Increased Safety Measures for Energy Development on the OCS," effective June 8, 2010. The Drilling Safety Rule (*Federal Register*, 2012a), effective October 22, 2012, implements certain additional safety measures recommended in NTL 2010-N05 by

incorporating the recommendations in the Safety Measures Report and *Deepwater Horizon* Joint Investigation Team report. The BSEE amended 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. Operators are required to document any loss of well control event, even if temporary, and the cause of the event by mail or email to the addressee indicated in the NTL. The operator does not have to include kicks that were controlled but 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.

Not all loss of well control events result in blowouts, which are defined as any of the three loss of well control events above but which are most commonly thought of as a release to the human environment. A loss of well control can occur during any phase of development, i.e., exploratory drilling, development drilling, well completion, production, or workover operations. A loss of well control can occur when improperly balanced well pressure results in sudden, uncontrolled releases of fluids from a wellhead or wellbore (PCCI Marine and Environmental Engineering, 1999; Neal Adams Firefighters, Inc., 1991). From 2006 to 2010, of the 27 loss of well control events reported in the GOM, 7 (22%) resulted in loss of fluids at the surface or underground (USDOI, BSEE, 2012b). 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; blowouts resulting in the release of oil have been rare.

A blowout preventer (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. Depending on how it is configured, a BOP could weigh 250 tons and cost from $25 to $35 million, and higher. The BOP's were invented in the early 1920's and have been instrumental in ending dangerous, costly, and environmentally damaging oil gushers on land and in water. The BOP's have been required for OCS oil and gas operations from the time offshore drilling began in the late 1940's.

The BOP's are actuated as a last resort upon imminent threat to the integrity of the well or the surface rig. For cased wells, which is the normal situation, the hydraulic ram 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 3.2.2 of the 2012-2017 WPA/CPA Multisale EIS describes in detail the following blowout preventers and their effectiveness:

- pipe ram;
- annular preventer;
- blind ram and blind shear ram;
- subsea isolation device; and
- choke valves.

3.2.3. Pipeline Failures

Significant sources of damages to OCS pipeline infrastructure are 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. Chapter 3.2.3 of the 2012-2017 WPA/CPA Multisale EIS describes previous incidents of OCS-related pipeline failures.

An OCS-related spill ≥1,000 bbl would likely be from a pipeline accident; the median spill size is estimated to be 2,200 bbl for rig/platform and pipeline activities supporting a proposed action (Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS). For both the WPA and CPA proposed actions, up to one spill of this size is estimated to occur."

3.2.4. Vessel Collisions

The BSEE revised operator incident reporting requirements in a final rule effective July 17, 2006 (*Federal Register*, 2006). The new 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) requires 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 3.2.4 of the 2012-2017 WPA/CPA Multisale EIS provides data related to vessel collisions and discusses methods of prevention and avoidance of vessel collisions.

3.2.5. Chemical and Drilling-Fluid Spills

BOEM and USCG categorize spill volumes using different units. BOEM works in barrels while USCG works in gallons.

Minor	Medium	Major
<238 bbl (<10,000 gal)	238-2,380 bbl (10,000-99,999 gal)	≥2,381 bbl (100,000 gal)

1 bbl = 42 U.S. gallons.

Chapter 3.2.5 of the 2012-2017 WPA/CPA Multisale EIS describes OCS-related chemical and synthetic-based fluid spills. Table 3-26 of the 2012-2017 WPA/CPA Multisale EIS provides information related to the number and volume of chemical and synthetic-based fluid spills in the Gulf of Mexico between 2001 and 2009.

3.3. CUMULATIVE ACTIVITIES SCENARIO

3.3.1. 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 activity period. Projected reserve/resource production for the OCS Program (**Table 3-1**; WPA, CPA, and EPA) is 18.34-25.64 Bbbl of oil and 75.886-111.627 Tcf of gas. **Tables 3-4 through 3-6** present projections of the major activities and impact-producing factors related to future Gulfwide OCS Program activities

The level of OCS activity is connected to oil prices, resource potential, cost of development, and rig availability rather than just, or even primarily to, 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 **Chapters 4.1.1 and 4.2.1**.

Note that offshore and onshore impact-producing factors and scenarios associated with an EPA proposed action, i.e., a typical sale that would result from a proposed lease sale within the EPA, as well as OCS Program activity resulting from past and future lease sales in the EPA will be disclosed in a subsequent Eastern Planning Area EIS within this Five-Year Program.

3.3.2. State Oil and Gas Activity

All of the five Gulf Coast States have had some historical oil and gas exploration activity, and with the exception of Florida and Mississippi, all 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 describes oil and gas activities, including pipeline infrastructure, within the State waters of Texas, Louisiana, Mississippi, and Alabama.

3.3.3. Other Major Factors Influencing Offshore Environments

Other influencing factors occur in the offshore areas of Gulf Coast States while OCS activity takes place at the same time. Some of these factors are dredged material disposal, OCS sand borrowing, marine transportation, military activities, artificial reefs and rigs-to-reefs development, offshore liquefied natural gas (LNG) projects, development of gas hydrates, renewable energy and alternative use, and recreational and commercial fishing. Chapter 3.3.3 of the 2012-2017 WPA/CPA Multisale EIS provides a detailed description of these influencing factors.

3.3.4. Other Major Factors Influencing Coastal Environments

Natural and man-caused factors influence the coastal areas of the Gulf States while OCS activity takes place at the same time. Some of these factors are sea-level rise and subsidence; Mississippi Delta hydromodifications; maintenance dredging activities; Coastal Impact Assistance Program activities; and coastal restoration programs. Chapter 3.3.4 of the 2012-2017 WPA/CPA Multisale EIS provides a detailed description of these influencing factors. No significant new information was discovered since publication of the 2012-2017 WPA/CPA Multisale EIS related to factors influencing coastal environments that would change the conclusions presented in the 2012-2017 WPA/CPA Multisale 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 Gulf of Mexico, including physical oceanography and hurricanes.

On August 28, 2012, Hurricane Isaac made landfall in southeastern Louisiana as a Category 1 hurricane. No moderate or extensive damage was reported to offshore oil or gas infrastructure in the Gulf of Mexico; however, Hurricane Isaac did result in the suspension of small amounts of tarballs and some oil from sediments. This is in line with predictions in the 2012-2017 WPA/CPA Multisale EIS analysis and is discussed more fully in **Chapter 4.2.1.2.1** of this Supplemental EIS.

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 *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). An analysis of the routine, accidental, and cumulative impacts of a WPA or CPA proposed action on the environmental, socioeconomic, and cultural resources of the Gulf of Mexico can be found in Chapters 4.1.1 and 4.2.1 of the 2012-2017 WPA/CPA Multisale EIS, respectively. The 2012-2017 WPA/CPA Multisale EIS is hereby incorporated by reference.

The purpose of this Supplemental EIS is to determine if there are significant new circumstances or information bearing on the proposed actions or their impacts, as stated in the 2012-2017 WPA/CPA Multisale EIS, and, if so, to disclose those changes and conclusions. This includes all relevant new information available since the publication of the 2012-2017 WPA/CPA Multisale EIS. This Supplemental EIS analyzes the potential impacts of the WPA and CPA proposed actions on sensitive coastal environments, offshore marine resources, onshore and offshore socioeconomic resources, and cultural resources.

It must be understood that this Supplemental EIS analyzes the proposed action and alternatives for the proposed WPA and CPA lease sales. This is not an EIS on the *Deepwater Horizon* explosion, oil spill, and cleanup, although information on this is being analyzed as it applies to resources in the WPA and CPA.

4.1. PROPOSED WESTERN PLANNING AREA LEASE SALE 233

Proposed WPA Lease Sale 233 is tentatively scheduled to be held in August 2013. The proposed WPA lease sale area encompasses virtually all of the WPA's 28.58 million ac. This area begins 3 marine leagues (9 nmi; 10.35 mi; 16.67 km) offshore Texas and extends seaward to the limits of the United States' jurisdiction over the continental shelf (often the Exclusive Economic Zone) in water depths up to approximately 3,346 m (10,978 ft) (Figure 1-1 of the 2012-2017 WPA/CPA Multisale EIS). As of March 2013, approximately 20.7 million ac of the proposed WPA lease sale area are currently unleased. The WPA proposed action would offer for lease all unleased blocks within the proposed WPA lease sale area for oil and gas operations (**Figure 2-1**), with the following exception:

(1) whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary (i.e., the boundary as of the publication of this Supplemental EIS).

Alternative A (The Proposed Action) of the 2012-2017 WPA/CPA Multisale EIS also included an exclusion of whole and partial blocks that lie within the 1.4-nmi buffer zone north of the maritime boundary between the United States and Mexico. The U.S. and Mexico have been pursuing an Agreement to govern the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico. On February 20, 2012, the Agreement was signed by representatives of each Government, but it has not yet entered into force. Upon its entry into force, the blocks and acreage in this buffer zone that were not offered in past lease sales will become available for leasing. As the Agreement may enter into force prior to the tentative date scheduled to hold proposed WPA Lease Sale 233, BOEM has considered this 1.4-nmi buffer area as being potentially available for lease under Alternative A. There are no known features of the buffer zone that would distinguish these blocks from those adjacent blocks that were considered in the 2012-2017 WPA/CPA Multisale EIS (e.g., no known topographic features, no identified critical habitat) or that would alter the conclusions on impacts that may be expected to result if the proposed action is chosen. However, all resources in the buffer area would be considered in postlease activities and plan approval reviews. Further, there are no known features in this area that would suggest resources would react to potential impact-producing factors differently than those areas and resources already identified.

Although the leasing of portions of the WPA (subareas or blocks) can be deferred during a Five-Year Program, DOI is conservative throughout the NEPA process and includes the total area within the Gulf of Mexico planning areas for analysis.

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 WPA proposed action or the alternatives, and it presents analyses of the potential impacts of routine events, accidental events, and cumulative activities on these resources. Baseline data are considered in the assessment of impacts from proposed WPA Lease Sale 233 on these resources. For additional information on the baseline data for the physical, biological, and socioeconomic resources that would potentially be affected by the WPA proposed action or the alternatives, refer to Chapter 4.1.1 of the 2012-2017 WPA/CPA Multisale EIS.

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 analyses of impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup on the physical, biological, and socioeconomic resources below are based on post-*Deepwater Horizon* credible scientific information that was publicly available at the time this document was prepared and were applied using accepted methodologies. BOEM will continue to monitor these resources for effects caused by the *Deepwater Horizon* explosion, oil spill, and cleanup.

Chapter 3.2.1 provides a brief summary of the information on accidental spills that could result from all operations conducted under the OCS Program, as well as information on the number and sizes of spills from non-OCS sources. The number of spills ≥1,000 bbl and <1,000 bbl estimated to occur as a result of the WPA proposed action is provided in Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS. The mean number of spills ≥1,000 bbl estimated for the WPA proposed action is <1 spill. Spill rates for several spill-size categories are provided in Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS. The probabilities of a spill ≥1,000 bbl occurring and contacting modeled environmental resources are described in Chapter 3.2.1.8 and Figures 3-8 through 3-28 of the 2012-2017 WPA/CPA Multisale EIS. For additional information on accidental spills that could result from all operations conducted under the OCS Program, as well as information on the number and sizes of spills from non-OCS sources, refer to Chapter 3.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

The potential impacts of a low-probability, catastrophic oil spill, such as the one that resulted from the *Deepwater Horizon* explosion, to the environmental and cultural resources and the socioeconomic conditions analyzed in the 2012-2017 WPA/CPA Multisale EIS are addressed in the "Catastrophic Spill Event Analysis" (Appendix B of the 2012-2017 WPA/CPA Multisale EIS). The reader is referred to Appendix B of the 2012-2017 WPA/CPA Multisale EIS for the analysis of potential effects of a catastrophic event for each resource. BOEM reviewed relevant information available since the 2012-2017 WPA/CPA Multisale EIS and, where relevant, summarized this information in the individual resource analyses below; however, BOEM's subject-matter experts determined that none of this newly available information significantly changed the analyses or conclusions regarding catastrophic events in Appendix B of the 2012-2017 WPA/CPA Multisale EIS. BOEM's analyses and conclusions of catastrophic events in Appendix B of the 2012-2017 WPA/CPA Multisale EIS remain unchanged and, therefore, BOEM refers the reader to Appendix B of the 2012-2017 WPA/CPA Multisale EIS for the analysis of the potential effects of a catastrophic event for each resource.

The cumulative analyses below consider impacts to physical, biological, and socioeconomic resources that may result from the incremental impact of proposed WPA Lease Sale 231when added to all past, present, and reasonably foreseeable future human activities, including non-OCS activities, as well as all OCS activities (OCS Program). A summary of the environmental impacts of the cumulative case for the Gulf of Mexico resources are found in the individual resource analyses in **Chapters 4.1.1 and 4.2.2**. For additional information on environmental impacts of the cumulative case for the Gulf of Mexico resources, refer to Chapters 4.1.1 and 4.2.2 of the 2012-2017 WPA/CPA Multisale EIS.

Non-OCS activities include, but are not limited to, import tankering; State oil and gas activity; recreational, commercial, and military vessel traffic; offshore LNG activity; recreational and commercial fishing; onshore development; and natural processes. 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.

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 is 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, CAA, CZMA, 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 EIS's, a variety of subsequent postlease NEPA reviews, and are also involved with ESA, essential fish habitat, 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, a set of assumptions and a scenario are developed, and impact-producing factors that could occur from routine oil and gas activities, as well as accidental events, are described. This information is summarized in **Chapter 3** of this Supplemental EIS and is discussed in detail in Chapter 3 of the 2012-2017 WPA/CPA Multisale EIS. Using this information, the multidisciplinary staff described above applies their knowledge and experience to conduct their analyses of the potential effects of proposed WPA Lease Sale 233.

The conclusions developed by the subject-matter experts regarding the potential effects of proposed WPA Lease Sale 233 for most resources are necessarily qualitative in nature; however, they are based on the expert opinion and judgment of highly trained subject-matter experts. This 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 cleanup, and applied using accepted methodologies. 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. This approach is described in the next subsection on "Incomplete or Unavailable Information."

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

BOEM has made conscientious efforts to comply 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, there are references to incomplete or unavailable information, particularly in relation to the *Deepwater Horizon* explosion, oil spill, and cleanup. The subject-matter experts for each resource used what scientifically credible information was publicly available at the time this Supplemental EIS was written. This information is summarized in **Chapter 4.1.1** of this Supplemental EIS and is discussed in detail for each resource in Chapter 4.1.1 of the 2012-2017 WPA/CPA Multisale EIS. Where necessary, BOEM's subject-matter experts extrapolated from existing or new information, using accepted methodologies, to make reasoned estimates and developed conclusions regarding the current WPA baseline for resource categories and expected impacts from the WPA proposed action given any baseline changes. There are no changes to the conclusions presented in the 2012-2017 WPA\CPA Multisale EIS.

As with the 2012-2017 WPA/CPA Multisale EIS, the most notable incomplete or unavailable information relates to the *Deepwater Horizon* explosion, oil spill, and cleanup in the CPA. Credible

scientific data regarding the potential short-term and long-term impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup on both CPA or WPA resources is becoming available but remains incomplete at this time, and it could be many years before this information becomes available via the NRDA process, BOEM's Environmental Studies Program, and numerous studies by academia. Nonetheless, the subject-matter experts acquired and used newly available, scientifically credible information, determined that other additional information was not available absent exorbitant expenditures or could not be obtained regardless of cost in a timely manner, and where gaps remained, exercised their best professional judgment to extrapolate baseline conditions and impact analyses using accepted methodologies based on credible information.

It is important to note that, barring another catastrophic oil spill, which is a low-probability accidental event, the adverse impacts associated with the proposed WPA lease sale are small, even in light of the *Deepwater Horizon* explosion, oil spill, and cleanup. This is because of BOEM's lease sale stipulations and mitigations, site-specific mitigations that become conditions of plan or permit approval at the postlease stage, and mitigations required by other State and Federal agencies.

The incomplete or unavailable information identified by the subject-matter experts were grouped into categories that were evaluated to determine whether that information was essential to a reasoned choice among alternatives:

- Physical Resources in the WPA: Physical resources (i.e., water quality and air quality) within the WPA were likely not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the best available information and the WPA's distance from the *Macondo* well. BOEM has determined that the information is not essential to a reasoned choice among alternatives. In any event, much of the information related to the *Deepwater Horizon* explosion, oil spill, and cleanup 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 this data would become publicly available in the near term, and certainly not within the timeframe contemplated by this NEPA analysis.

- Nonmobile Biological Resources within the WPA: Coastal and offshore biological and benthic habitats (i.e., barrier beaches, wetlands, seagrasses, soft bottom benthic communities, topographic features, and chemosynthetic and nonchemosynthetic communities) and nonmobile benthic species that would be expected to spend their entire life cycle in the WPA were likely not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the WPA's distance from the *Macondo* well and currently available data indicating that the spill did not reach WPA waters or sediments. Similarly to the analysis of physical resources in the WPA described in the preceding paragraph, BOEM has determined that the incomplete or unavailable information regarding nonmobile resources is not essential to a reasoned choice among alternatives.

- Mobile Biological Resources within or Migrating through the WPA: Certain mobile biological resources (i.e., birds, fish, marine mammals, and sea turtles) having ranges and/or habitats that may include different areas in the Gulf of Mexico may have individually been affected by exposure to oil and/or spill-response activities, provided they were in the vicinity of the *Deepwater Horizon* explosion, oil spill, and cleanup during spill conditions. BOEM has concluded that this incomplete or unavailable information is not essential to a reasoned choice among the alternatives since the adverse impacts from routine activities associated with the WPA proposed action are expected to be small, even in light of how baseline conditions may have been changed by the *Deepwater Horizon* explosion, oil spill, and cleanup. It is not essential to a reasoned choice among the alternatives because the subject-matter experts for this Supplemental EIS have already evaluated the probability and severity of these potential impacts and it is not essential to understand every particular mechanism by which these significant impacts could occur, in light of the scientifically credible information that was available and applied. In any event, it is

not expected that this data would become publicly available within the timeframe contemplated by this NEPA analysis. However, any incomplete or unavailable information regarding the nature of a very large spill would not be essential to a reasoned choice among the alternatives. A catastrophic spill and its impacts are not "expected" as a result of the WPA proposed action since it remains a low-probability event, particularly in light of improved safety and oil-spill-response requirements that have been put in place since the spill.

- 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 cleanup. 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 in this case) 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 WPA proposed action during the reinitiated Section 7 consultation is consistent with the requirements of ESA Section 7(d) because (1) approving and/or conducting these activities 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 these plans and permits 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 these 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 are ongoing.

- Natural Resource Damage Assessment (NRDA) Data: In response to the *Deepwater Horizon* explosion, oil spill, and cleanup, a major NRDA is underway to assess impacts to all natural resources in the Gulf of Mexico that may have been impacted by the resulting spill from the *Macondo* well, as well as impacts from the spill-response operations. The NRDA is mandated by the Oil Pollution Act of 1990. The U.S. Department of the Interior is a co-Trustee in the NRDA process, and BOEM is a cooperating agency on a Programmatic EIS being prepared as part of the NEPA analysis for NRDA. However, the NRDA process is being led by the NRDA Trustees, which include NOAA and DOI (FWS and NPS), but not BOEM. BOEM is listed as an affected party for NRDA purposes. At this time, limited data compiled in the NRDA process have been made publicly available. Because limited data have been made publicly available, most NRDA datasets are not available for BOEM to use in its NEPA analyses. 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 this 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 WPA lease sale are small, even in light of how baseline conditions in the WPA may have been changed by the *Deepwater Horizon* explosion, oil spill, and cleanup. The impacts are expected to be small because of BOEM's lease sale stipulations and mitigations, site-specific mitigations that become conditions of plan or permit

approval at the postlease stage, and mitigations required by other State and Federal agencies. Even if the NRDA data were essential to a reasoned choice among the alternatives, it is not publicly available and much of the data may not become available for many years. The NEPA allows for decisions to be made based on available scientifically credible information applied using accepted methodologies where the incomplete information cannot be obtained or the cost of obtaining is exorbitant. The NRDA process is ongoing and there is no timeline on when this information will be released. It is not within BOEM's authority to obtain this information. Cost is not an issue in obtaining the information, regardless of whether the cost would be exorbitant or not. The limitations on the NRDA process, including statutory requirements under the Oil Pollution Act of 1990, are the determining factors on the availability of this information, not the cost of obtaining it. In light of the fact that the NRDA data may not be available for years, BOEM has used accepted scientific methodologies to evaluate each resource, as described in this chapter. Since the spill, the Gulf of Mexico OCS Region's Environmental Studies Program has continually modified its Studies Plan to reflect this Agency's current information needs for studies that address impacts and recovery from the oil spill. BOEM's proposed studies attempt to avoid duplication of study efforts yet fill information gaps where NRDA studies may not address particular resources and their impacts from the oil spill. The NEPA allows for decisions to be made based on available scientifically credible information applied using accepted methodologies where the incomplete information cannot be obtained or the cost of obtaining is exorbitant. As such, BOEM has applied the scientifically credible information that is available using accepted methodologies, in light of this unavailable NRDA data.

- 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. With regard to the *Deepwater Horizon* explosion, oil spill, and cleanup, BOEM has determined that the incomplete or unavailable information would not be essential to a reasoned choice among alternatives.

This chapter has thoroughly examined the existing credible scientific evidence that is relevant to evaluating the reasonably foreseeable significant adverse impacts of the WPA proposed lease sale on the human environment. The subject-matter experts that prepared this Supplemental EIS conducted a diligent search for pertinent 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. 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 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for air quality presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

Further, a search was conducted for information published on air quality, and various Internet and publicly available sources were examined to determine any recent information regarding air quality. Sources investigated included, but were not limited to, journals and scientific articles, Google, Google Scholar, and several USEPA websites. All relevant new information is included below; however, no new significant information was discovered since publication of the 2012-2017 WPA/CPA Multisale EIS that would impact the conclusions herein.

As BOEM has previously noted in the 2012-2017 WPA/CPA Multisale EIS and despite the new information identified and provided below, there is incomplete or unavailable information regarding air quality and potential air impacts. Although final summary information and reports on air quality impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup may be forthcoming, USEPA, NOAA, and other agencies obtained and released to the public a large number of air quality measurements indicating that air impacts tended to be minor and below USEPA's health-based standards. As there are no continuing sources of air pollution related to the *Deepwater Horizon* explosion, oil spill, and cleanup, BOEM would not expect any additional measurements or information to alter the conclusions from currently existing data. In addition, as noted below and in **Appendix A**, 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 WPA proposed action would take place. 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. As such, although there is incomplete or unavailable information on air quality impacts at this time that may be relevant to reasonably foreseeable adverse impacts, this information is not essential to a reasoned choice among alternatives and are presented in Chapter 4.1.1.1.1 of the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated by reference from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since that document was prepared. A brief summary of potential impacts follows. Emissions of pollutants into the atmosphere from the routine activities associated with the WPA proposed action are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, emission heights, emission rates, and the distance of these emissions from the coastline. The impacts of the OCS emissions on the onshore air quality are below USEPA's Significance Impact Levels (SIL's) and BOEM's Significance Levels, and they are well 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. These emissions from routine activities and accidental events associated with the WPA proposed action are not expected to have concentrations that would change onshore air quality classifications.

Air Quality Modeling

There are many factors that BOEM evaluates to determine the potential impact occurring from offshore air emissions. These include estimates for likely emission sources, likely emission locations, emission rates, timeframes, and the likelihood of transport by wind 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 (**Chapters 4.1.1 and 4.2.1**). BOEM uses data gathered during recent OCS emission inventories, along with a scenario or estimates of future production, to evaluate the potential effects of emissions. The scenario provides (1) the set of assumptions for and estimates of future activities, (2) the rationale for the scenario assumptions and estimates, and (3) the type, frequency, and quantity of emissions from offshore sources associated with the WPA proposed action.

BOEM determined projected emissions resulting from the activities on the lease based on known emissions from various equipment, such as diesel engines and generators, and the level of offshore activity projected in the 2012-2017 WPA/CPA Multisale EIS. BOEM then uses a numerical model to calculate the concentration of five pollutants (nitrogen oxides [NO_x], sulphur oxides [SO_x], particulate matter less than or equal to 2.5 μm [$PM_{2.5}$], particulate matter less than or equal to 10 μm [PM_{10}], and carbon monoxide [CO]) at the receptor. Inputs to the model include the location of the emission source and the receptors, the aforementioned emissions, source parameters such as source height and source

stack gas temperature, and a 5-year history of meteorological conditions. The latter two parameters influence the dispersion of the pollutant as it is carried from the source to the receptor. The model output is the concentration of the pollutant at the onshore receptor location at specified time intervals. A description of the numerical model, called the Offshore Coastal Dispersion (OCD) Model, and its results are summarized in **Appendix A**. One of the limitations of the OCD Model is that it is unable to directly model contributions to ambient ozone. To address this limitation, BOEM examined available studies on OCS oil and gas activities' contribution to onshore ozone levels, as described below and in **Appendix A**. These studies confirm that OCS oil and gas activities are likely to only have a minimal impact on onshore ozone.

The Comprehensive Air Quality Model with extensions (CAMx) was used to model contribution during an August 2000 ozone episode (Yarwood et al., 2004). The OCS contributions to ozone exceedances were minor. Yarwood et al. (2004) used a photochemical model to analyze the Year 2000 Gulfwide Emissions Inventory (GWEI) and selected the Houston-Galveston-Brazoria nonattainment area since it has the most severe ozone problem in the Gulf of Mexico region (System Applications International et al., 1995). One of the main relevant findings in Yarwood et al. (2004) is as follows: "The average impact of the Year 2000 GWEI emissions on 8-hour ozone levels above 85 ppb in Houston area is 0.2 ppb; although larger impacts may occur over the Gulf of Mexico." Haney et al. (2008) performed a modeling investigation using the Year 2000 and Year 2005 GWEI's in the WPA and CPA to evaluate the impact of offshore emissions on offshore and onshore ozone air quality, in which they proposed an emission-reduction scenario. They found a particular ozone episode where the onshore impact from all offshore oil-and-gas-related sources was small but generally larger than those estimates using the Year 2000 GWEI. They noticed higher simulated ozone concentrations from 2005 emissions due to increases in NO_x and VOC concentrations.

The OCD modeling was performed for the WPA Class II Areas, with the hypothetical WPA source located at East Breaks Block 446, which is approximately 80 mi (129 km) from shore. Meteorological data used were from the period 2000 through 2004. The meteorological data were from Corpus Christi, Texas, for both surface and upper air, as well as Buoy 42019. These meteorological data points are the closest, physically, to the proposed lease sale areas available to BOEM and, therefore, are the best approximation available. BOEM calculated scenario-specific emissions based on the *Year 2008 Gulfwide Emission Inventory Study* (Wilson et al., 2010) and Rigzone (2009). A spreadsheet was developed based on the findings of this study (Billings et al., official communication, 2012). To provide a conservative estimate, BOEM assumed a high-range of activity emissions during the year with the greatest amount of activity (e.g., drilling and platform and pipeline installation) out of the 40-year analysis period for the WPA proposed action. All of the scenario-predicted emissions were then modeled at one location in the WPA. Even with all the emissions being attributed to a single point (which would not be the case in reality and thus provide a conservative estimate of impacts), the WPA emissions are projected to have minimal impacts to onshore air quality. The WPA emissions are within BOEM's maximum allowable increase for the scenario. Methodology, emissions, and modeling results are discussed further in **Appendix A**. As shown in **Appendix A**, emissions of pollutants into the atmosphere from the activities associated with the OCS Program are estimated to have minimal effects on onshore air quality because of the prevailing atmospheric conditions, emission rates and mixing heights, and the resulting pollutant concentrations. Given that these very conservative estimates of emissions were modeled and still below both agencies' regulatory thresholds, BOEM believes that the potential onshore impacts related to emissions from OCS oil and gas activities that may result from the WPA proposed action will not be significant.

BOEM is in the process of a comprehensive assessment of numerical methods (including a variety of sensitivity analysis, comparison of emission inventories and evaluation of emission scenarios) using USEPA-approved models, which will help us to support our scientific statements in future EIS's. This modeling assessment will be helpful when considering that modern air quality models are still in development and need to be evaluated before they are widely used for realistic estimations of pollutant concentrations over offshore and coastal environments. However, this assessment will take time, potentially years, and there will always be some limitations in the application of models. For this reason, BOEM is using the OCD Model as it is appropriate for the offshore environment. BOEM's subject-matter experts also used their professional judgment in developing and modeling parameters to ensure that the results were conservative.

In response to the FY 2008 Consolidated Appropriations Act, USEPA issued 40 CFR 98, which requires the reporting of greenhouse gas emissions. Subpart W of the Greenhouse Gas Reporting Rule requires petroleum and natural gas facilities that emit 25,000 metric tons or more of carbon dioxide (CO_2) equivalents per year to report emissions from equipment leaks and venting. On average, the amount of CO_2 emissions from a typical well site is about 237-439 tons per year. Subpart C of the Green House Gas Reporting Rule requires operators to report greenhouse gas emissions from general stationary fuel combustion sources to USEPA. At this point this is just a reporting requirement; there are no specific NAAQS or emission limitations for greenhouse gases.

BOEM has included in **Appendix A** modeled estimates for certain greenhouse gases that may be directly emitted during OCS oil and gas activities. At this time, the greenhouse gas emissions related to OCS oil and gas activities are a very small percentage of national emissions, and it would be impossible to tease out the impacts from this small incremental addition from global climate change impacts attributable to all other global sources. As such, BOEM does not believe that the potential greenhouse gas emissions directly attributable to oil and gas activities on the OCS as a result of the WPA proposed action are significant to global greenhouse gas levels.

On the basis of OCD modeling for NO_x, SO_x, $PM_{2.5}$, $PM_{10,}$ and CO, and the *Gulf of Mexico Air Quality Study* for O_3 (Science Applications International et al., 1995), BOEM is confident that offshore OCS oil and gas activities associated with the WPA proposed action will not contribute to exceedances of the NAAQS at the shoreline. The inference of conclusions from this study remains appropriate given both the decrease in the number of wells drilled and wells producing from wells in water depths <1,000 ft (305 m) and the industrial expansions into the deepwater Gulf of Mexico. During the past 5 years, 2008-2012, the number of wells drilled in shallow water (<1,000-m [305-m] water depth) decreased by 45 percent from 468 wells in 2008 to 256 wells in 2012. The number of wells producing decreased by 23 percent from 5,648 to 4,355 wells during the same 5-year timeframe. Simultaneously, production expansion into deep water was documented in *Deepwater Gulf of Mexico 2006: America's Expanding Frontier* (USDOI, MMS, 2006) and in the biennial reports that preceded the 2006 version. According to the report, over the last 14 years, there has been an overall expansion in all phases of deepwater activity. There are approximately 8,221 existing leases in the Gulf of Mexico OCS, 54 percent of which are in deep water (USDOI, MMS, 2006). (Note that lease status may change daily; therefore, the current number of existing leases is an approximation.) Contrast this to the approximately 5,600 existing leases in the Gulf of Mexico in 1992, only 27 percent of which were in deep water. On average, there were 30 rigs drilling in deep water in 2005, compared with only 3 rigs in 1992. Likewise, deepwater oil production rose over 840 percent and deepwater gas production increased about 1,600 percent from 1992 to 2002 (USDOI, MMS, 2006). This trend is observable in seismic activity, leasing, exploratory drilling, field discoveries, and production.

The quantity of air pollutants emitted is the direct result of the level of offshore activity. The concentrations of the emissions at the shoreline are influenced by the distance between the source of the emissions and the receptors. With the simultaneous decrease in both the number of wells drilled and the number of wells producing in water depths < 1,000 m (305 m) (shallow waters closest to shore), and the increase is leases, drilling, and production in water depths >1,000 m (305 m) (deeper waters farther from shore), it can be assumed that the emissions related to exploration and production activity have also moved farther offshore. As a result of these trends for fewer wells and wells that are farther offshore, the OCD modeling results obtained from Systems Applications International et al. in 1995, which demonstrate no NAAQS exceedances, remain conservative and are still applicable to the discussion of shoreline impacts from leases and associated activity projected to result from proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231. BOEM, however, supplemented this knowledge with additional data available since that time and by running the OCS model accompanying this Supplemental EIS. As shown in **Appendix A**, scenario-specific emissions of pollutants into the atmosphere from the routine activities associated with the WPA proposed action are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, emission heights, emission rates, and the distance of these emissions from the coastline. Emissions from proposed-action activities as modeled in **Appendix A** will not contribute to any onshore exceedances of the NAAQS.

Impact Analysis

The following routine activities associated with the WPA proposed action would potentially affect air quality: 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. The impact analysis is based on four parameters—emission rates, surface winds, atmospheric stability, and the mixing height. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on air quality can be found in Chapter 4.1.1.1.2 of the 2012-2017 WPA/CPA Multisale EIS. Emissions of pollutants into the atmosphere from the activities associated with the WPA 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 WPA proposed action would result in the emission of air pollutants. The OCS oil- and gas-related accidents 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 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 all NAAQS-regulated primary pollutants, including nitrogen dioxide (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. These response activities are temporary in nature and occur offshore; therefore, there are little expected impacts from these actions to onshore air quality. Accidents involving high concentrations of H_2S could result in deaths as well as environmental damage. Regulations and NTL's mandate safeguards and protective measures, which are in place, to protect workers from H_2S releases. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on air quality can be found in Chapter 4.1.1.1.3 of the 2012-2017 WPA/CPA Multisale EIS. Other emissions of pollutants into the atmosphere from accidental events as a result of the WPA 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.

Overall, since loss of well-control events, blowouts, and fires are rare events and are of short duration, potential impacts to air quality are not expected to be significant except in the rare case of a catastrophic event, and in such cases, are anticipated to be temporary. To date, air monitoring conducted following the *Deepwater Horizon* explosion, oil spill, and cleanup has not found any pollutants at levels expected to cause long-term harm (USEPA, 2010), and this is addressed in Chapter 4.1.1.23.4 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS.

The activities in the cumulative scenario that could potentially impact onshore air quality considered here are the WPA proposed action, the OCS Program, State oil and gas programs, other major factors influencing offshore environments, onshore non-OCS activities, accidental releases from oil spills, accidental releases of H_2S, natural events (e.g., hurricanes), and a catastrophic oil spill. Because the OCS Program includes both new drilling and production as well as production ending on older wells and platform removal, the level of impacts determined in earlier studies are assumed to adequately represent current conditions as well.

Emissions contributing to air quality degradation come from many sources. The NAAQS list is made up of the most common air pollutants, including ozone, particulate matter, NO_x, and SO_x. Air pollutants on the NAAQS are commonly referred to as criteria pollutants because they are ubiquitous. Although these pollutants can all occur naturally, elevated levels are the result of human activities.

Ozone pollution is mainly a daytime problem during the summer months. Strong sunlight and hot weather cause ground-level ozone to form in harmful concentrations in the air. Ozone is not emitted directly into the air. Ozone is a secondary pollutant formed in the presence of sunlight from the reaction of VOC's and NO_x. These pollutants are found in emissions from the following: vehicles such as automobiles, trucks, buses, aircraft, and locomotives; construction equipment; lawn and garden equipment; sources that combust fuel, such as large industries and utilities; small industries such as gas stations and print shops; and consumer products, including some paints and cleaners. In addition, biogenic, or natural emissions from trees and plants, are a major source of VOC's.

The concentration of ozone in the air is determined not only by the amounts of ozone precursor chemicals but also by weather and climate factors. Intense sunlight, warm temperatures, stagnant high-pressure weather systems, and low wind speeds cause ozone to accumulate in harmful amounts. Ozone precursors, NO_x and VOC's, are shown to have more ozone-emitting sources present onshore. According to USEPA, automobiles and other mobile sources contribute about one-half of the NO_x that is emitted. According to NOAA, power plants emit about one-quarter of the total U.S. human-made contribution of NO_x to the atmosphere. All other sources of NO_x emissions account for one-quarter of the United States' totals.

Shore-based sources of $PM_{2.5}$ include all types of combustion activities related to both human activities and naturally occurring sources. Sources range from large and highly regulated industrial sources down to sources related to activities of an individual such as trash burning. Some of the most cited additional sources include fuel burning associated with motor vehicles, power plants, wood burning, and certain industrial processes.

Fine particulate matter can also form when gases from burning fuels react with sunlight and water vapor. These can result from fuel combustion in motor vehicles, at power plants, and in other industrial processes. Sources of coarse particles, PM_{10}, include crushing or grinding operations and dust from paved or unpaved roads.

Sources of SO_x include all types of activities ranging from large, highly regulated industrial sources, down to sources related to individual human activities such as outdoor grilling. Fossil fuels contain varying amounts of sulfur. Over 65 percent of the SO_x released to the air comes from electric utilities that burn coal. Some additional commonly cited sources of SO_x include pulp and paper mills, petroleum refining, and nonferrous smelters. Fuel burning associated with motor vehicle usage in is another source.

Sources of NO_x includes all types of activities ranging from large, highly regulated industrial sources down to sources related to the activities of individual people, for example, the use of personal watercraft (jet ski). Some of the most commonly city sources of NO_x include motor vehicles, electric utilities, and other industrial commercial and residential sources that burn fuels. Because NO_x is a highly reactive chemical, it can contribute to ozone formation in the presence of VOC's in the presence of heat and sunlight.

Emission trends from Gulfwide platform sources from 2000, 2005, 2008, and 2011 show that emissions offshore are consistent. A detailed impact analysis of the cumulative impacts of proposed WPA Lease Sale 233 on air quality can be found in Chapter 4.1.1.1.4 of the 2012-2017 WPA/CPA Multisale EIS.

Other major factors influencing coastal environments, such as sand borrowing and transportation in State territorial waters, also generate emissions that can affect air quality. These emissions are regulated by State agencies and/or USEPA. Reductions have been achieved through the use of low sulfur fuels, catalytic reduction, and other efforts, and as a result, constitute minor impacts to onshore air quality.

The incremental contribution of the WPA proposed action (as analyzed in Chapter 4.1.1.1.2 of the 2012-2017 WPA/CPA Multisale EIS) to the cumulative impacts would be minimal. Portions of the Gulf Coast onshore areas have ozone levels that exceed the Federal air quality standard, but the incremental contribution from the WPA proposed action would be very small. The cumulative contribution to visibility impairment from the WPA proposed action is also expected to be very small. Area visibility is expected to improve somewhat as a result of regional and national programs to reduce emissions. The WPA proposed action would have an insignificant effect on ozone levels in ozone nonattainment areas and would not interfere with the States' schedule for compliance with the NAAQS.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of State and Federal databases, including updates to regulations, was conducted to determine the availability of recent information. No new significant information was discovered from these resources since the publication of the 2012-2017 WPA/CPA Multisale EIS that would impact the conclusion herein. However, BOEM calculated scenario-specific emissions based on the *Year 2008 Gulfwide Emission Inventory Study* (Wilson et al., 2010) and Rigzone (2009). Likewise, BOEM conducted OCD modeling on activity that will result from a lease sale using the scenarios for OCS activities in the WPA. These results are presented in **Table A-6** (**Appendix A**). The modeled impacts are below BOEM's maximum allowable increases, NAAQS, and the U.S. Environmental Protection Agency's SIL's for all the criteria pollutants except for the annual NO_x and the 24-hour $PM_{2.5}$ for PSD

Class I areas. Although the SIL's were exceeded, BOEM expects in practice, if the emissions were distributed more realistically across the WPA, that emissions would not exceed the SIL; and thus, actual emissions likely to result from the WPA proposed action would likely not be significant. The modeling that was conducted was overly conservative. All the emissions during 1 year for the entire WPA, which would actually be dispersed throughout the WPA, were modeled as if they originated in Mississippi Canyon Block 856.

Although final summary information and reports on air quality impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup may be forthcoming, USEPA, NOAA, and other agencies obtained and released to the public a large number of air quality measurements indicating that air impacts tended to be minor and below USEPA's health-based standards. As there are no continuing sources of air pollution related to the *Deepwater Horizon* explosion, oil spill, and cleanup, BOEM would not expect any additional measurements or information to alter the conclusions from currently existing data. As such, although there is incomplete or unavailable information on air quality impacts at this time that may be relevant to reasonably foreseeable adverse impacts, this information is not essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

BOEM has reexamined the analysis for air quality presented in the 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 air quality presented in the 2012-2017 WPA/CPA Multisale EIS. The OCD modeling results (included in **Appendix A**) confirms BOEM's conclusions in the 2012-2017 WPA/CPA Multisale EIS that offshore activities would not result in exceedances of the NAAQS at the shoreline. The only potential exception is for ozone, where there may be some minimal contribution to ozone at the shoreline. Ozone levels are on a declining trend because of air-pollution control measures that have been implemented by the States. This downward trend is expected to continue as a result of local as well as nationwide air-pollution control efforts.

The Gulf Coast has significant visibility impairment from anthropogenic emission sources. Area visibility is expected to improve somewhat as a result of regional and national programs to reduce emissions. However, the incremental contribution from the WPA proposed action would be very small and would have an insignificant effect on ozone levels in onshore ozone nonattainment areas. This minimal impact would not be a contributing factor to the States' schedule for attainment. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

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 2012-2017 WPA/CPA Multisale EIS, 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 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of coastal waters can be found in Chapter 4.1.1.2.1.1 of the 2012-2017 WPA/CPA Multisale EIS.

The following routine activities associated with proposed WPA Lease Sale 233 that would impact 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.

A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on coastal waters can be found in Chapter 4.1.1.2.2 of the 2012-2017 WPA/CPA Multisale EIS.

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. The impacts to coastal water quality from routine activities associated with the WPA proposed action should be minimal because of the distance to shore of most routine activities, USEPA regulations that restrict discharges, and the few, if any, new pipeline landfalls or onshore facilities that would be constructed.

Accidental events associated with the WPA proposed action that could impact coastal water quality include spills of oil and refined hydrocarbons, releases of natural gas, usage of chemical dispersants in oil spill response, spills of chemicals or drilling fluids, loss of well control, collisions, or other malfunctions that would result in such spills. A detailed impact analysis of accidental impacts that may be associated with proposed WPA Lease Sale 233 on coastal waters can be found in Chapter 4.1.1.2.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events associated with the WPA proposed action that could impact coastal water quality include spills of oil and refined hydrocarbons, releases of natural gas and condensate, usage of chemical dispersants in oil-spill response, spills of chemicals or drilling fluids, loss of well control, pipeline failures, collisions, or other malfunctions that would result in such spills. 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, hydromodification, and application of dispersants. Natural degradation processes will also decrease the amount of spilled oil over time. For coastal spills, two additional factors that must be considered are the shallowness of the area the spill is in and the proximity of the spill to shore. 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. Spills from collisions are not expected to be significant because collisions occur infrequently.

Activities in the cumulative scenario that could impact coastal water quality generally include the broad categories of the WPA proposed action and the OCS Program, State oil and gas activity, 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). Many of these categories will have some of the same specific impacts (e.g., vessel traffic will occur for all of these categories except natural processes). A detailed impact analysis of the cumulative impacts of proposed WPA Lease Sale 233 on coastal waters can be found in Chapter 4.1.1.2.1.4 of the 2012-2017 WPA/CPA Multisale EIS.

Water quality in coastal waters would be impacted by sediment disturbance and suspension (i.e., turbidity), vessel discharges, erosion, runoff from nonpoint-source pollutants (including river inflows), seasonal influences, and accidental events. These impacts may be a result of the WPA proposed action and the OCS Program, State oil and gas activity, the activities of other Federal agencies (including the military), natural events or processes, or 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). The impacts resulting from the WPA proposed action are a small addition to the cumulative impacts on the coastal waters of the Gulf because non-OCS activities, including vessel traffic, erosion, and nonpoint source runoff are cumulatively responsible for a majority of coastal water impacts. Since a catastrophic OCS Program-related accident would be both rare and not expected to occur in coastal waters, the impact of accidental spills is expected to be small. The effect on coastal water quality from smaller accidental spills is expected to be minimal relative to the cumulative inputs of hydrocarbons from other sources. The incremental contribution of the routine activities associated with the WPA proposed action to the cumulative impacts on coastal water quality is not expected to be significant.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Various Internet sources were examined and literature searches conducted in order to assess recent information regarding the water quality and sediment quality in coastal waters that may be pertinent to the WPA. The searches included, but were not limited to, Google, Google Scholar, several USEPA websites, the Gulf of Mexico Sea Grant Programs website, the Coastal Response Research at the University of New Hampshire website, and the NOAA Central Library *Deepwater Horizon*: A Preliminary Bibliography of Published Research and Expert Commentary website. The searches revealed that a recent study

independently analyzed chemical data from the *Deepwater Horizon* explosion, oil spill, and cleanup and derived an average environmental release rate for hydrocarbons of $(10.1 \pm 2.0) \times 10^6$ kilograms per day (kg/d) during the *Deepwater Horizon* oil spill, which confirmed the official average leak rate of $(10.2 \pm 1.0) \times 10^6$ kg/d (Ryerson et al., 2011). Another study found that water-soluble petroleum compounds were found to dissolve into the water column to a greater degree than what is typically observed for surface spills (Reddy et al., 2011). Furthermore, the study indicated that the oil contained approximately 3.9 percent polycyclic aromatic hydrocarbons (PAH's) by weight, which results in an estimated release of 2.1×10^{10} grams of PAH's (Reddy et al., 2011; Reddy, official communication, 2012). This research confirms information that was extrapolated in the 2012-2017 WPA/CPA Multisale EIS from then existing data on the *Deepwater Horizon* explosion and oil spill, namely that oil from a catastrophic event under pressure and with more soluble components may become entrained in the water column. As such, this new information has not altered the conclusions from the 2012-2017 WPA/CPA Multisale EIS. Coastal water quality within the WPA was likely not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the best available information and the WPA's distance from the *Macondo* well.

Additionally, the NPDES general permit for new and existing sources and new discharges in the offshore subcatergory of the oil and gas extraction point source category for the western portion of the Gulf of Mexico OCS (GMG290000; USEPA Region 6) was reissued on October 1, 2012, and will expire on September 30, 2017. As identified in the resource analyses in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS, incomplete or unavailable information regarding coastal water quality in the WPA may be relevant to reasonably foreseeable significant adverse effects. BOEM has determined that the information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for coastal water quality presented in the 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 water quality presented in the 2012-2017 WPA/CPA Multisale EIS, as these newly available studies confirmed earlier estimates of hydrocarbon releases and noted the overall return to pre-spill PAH concentrations thus far. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.2.2. Offshore Waters

BOEM has reexamined the analysis for offshore quality presented in the 2012-2017 WPA/CPA Multisale EIS, 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 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of offshore waters can be found in Chapter 4.1.1.2.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

The following routine activities associated with proposed WPA Lease Sale 233 that would impact 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.

A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on offshore waters can be found in Chapter 4.1.1.2.2.2 of 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 oil concentration of approximately 15 parts per million (ppm). Impacts to offshore waters from routine activities associated with the WPA proposed action should be minimal.

Accidental events associated with the WPA proposed action that could impact offshore water quality include spills of oil and refined hydrocarbons, releases of natural gas, usage of chemical dispersants in oil-spill response, spills of chemicals or drilling fluids, and loss of well control, collisions, or other malfunctions that would result in such spills. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on offshore waters can be found in Chapter 4.1.1.2.2.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events associated with the WPA proposed action that could impact offshore water quality include spills of oil and refined hydrocarbons, releases of natural gas and condensate, usage of chemical dispersants in oil-spill response, 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, since major losses of well control and blowouts are rare events, 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.

Activities in the cumulative scenario that could impact offshore water quality generally include the broad categories of the WPA proposed action and the OCS Program, the activities of other Federal agencies (including the military), natural events or processes, State oil and gas activity, 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). 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 will also affect offshore environments. Many of these categories will have some of the same specific impacts (e.g., vessel traffic will occur for all of these categories except natural processes). A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on offshore waters can be found in Chapter 4.1.1.2.2.4 of the 2012-2017 WPA/CPA Multisale EIS.

Water quality in offshore waters may be impacted by sediment disturbance and suspension (i.e., turbidity), vessel discharges, erosion and runoff of nonpoint-source pollutants (including river inflows), natural seeps, discharges from exploration and production activities, and accidental events. These impacts may be a result of the WPA proposed action and the OCS Program, the activities of other Federal agencies (including the military), and natural events or processes. To a lesser degree, these impacts may also be a result of State oil and gas activity or activities or 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). The impacts resulting from the WPA 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 industrial discharges. Since a catastrophic accident is rare, the impact of such accidents is expected to be small. The incremental contribution of the routine activities associated with the WPA proposed action to the cumulative impacts on coastal water quality is not expected to be significant.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Various Internet sources were examined and literature searches conducted in order to assess recent information regarding the water quality and sediment quality in offshore waters that may be pertinent to the WPA. The searches included, but were not limited to, Google, Google Scholar, several USEPA

websites, the Gulf of Mexico Sea Grant Programs website, the Coastal Response Research at the University of New Hampshire website, and the NOAA Central Library *Deepwater Horizon*: A Preliminary Bibliography of Published Research and Expert Commentary website. The searches revealed that a recent study independently analyzed chemical data from the *Deepwater Horizon* explosion, oil spill, and cleanup and derived an average environmental release rate for hydrocarbons of (10.1± 2.0) x 10^6 kg/d during the *Deepwater Horizon* oil spill, which confirmed the official average leak rate of (10.2 ± 1.0) x 10^6 kg/d (Ryerson et al., 2011). Another study found that water-soluble petroleum compounds were found to dissolve into the water column to a greater degree than what is typically observed for surface spills (Reddy et al., 2011). Furthermore, the study indicated that the oil contained approximately 3.9 percent PAH's by weight, which results in an estimated release of 2.1 x 10^{10} grams of PAH's (Reddy et al., 2011; Reddy, official communication, 2012). This research confirms information that was extrapolated in the 2012-2017 WPA/CPA Multisale EIS from then existing data on the *Deepwater Horizon* explosion, namely that oil from a catastrophic event under pressure and with more soluble components may become entrained in the water column. As such, this new information has not altered the conclusions from the 2012-2017 WPA/CPA Multisale EIS. Offshore water quality within the WPA was likely not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the best available information and the WPA's distance from the *Macondo* well.

Additionally, the NPDES general permit for new and existing sources and new discharges in the offshore subcatergory of the oil and gas extraction point source category for the western portion of the Gulf of Mexico OCS (GMG290000; USEPA Region 6) was reissued on October 1, 2012, and will expire on September 30, 2017. As identified in the resource analyses in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS, incomplete or unavailable information regarding offshore water quality in the WPA may be relevant to reasonably foreseeable significant adverse effects. BOEM has determined that the information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for offshore water quality presented in the 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 offshore water quality presented in the 2012-2017 WPA/CPA Multisale EIS, as these newly available studies confirmed earlier estimates of hydrocarbon releases and noted the overall return to pre-spill PAH concentrations thus far. Furthermore, efforts to better understand and prevent hypoxia are ongoing. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

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 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of coastal barrier beaches and associated dunes can be found in Chapter 4.1.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS.

The major routine impact-producing factors associated with the WPA proposed action that could affect these environments include navigational traffic, maintenance dredging of navigational canals, and construction and expansions of navigational canals and port facilities. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on coastal barrier beaches and associated dunes can be found in Chapter 4.1.1.3.2 of the 2012-2017 WPA/CPA Multisale EIS.

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 WPA proposed action are expected to be restricted to temporary and localized disturbances. The 0-1 pipeline landfalls projected in support of the WPA proposed action are not expected to cause significant impacts to barrier beaches because of the use of nonintrusive installation methods and regulations. 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 gas processing facilities would not be expected to be constructed on barrier beaches. The WPA proposed action may contribute to the continued use of such facilities that already exist.

Maintenance dredging of barrier inlets and bar channels is expected to occur, which combined with channel jetties, generally causes minor and localized impacts on adjacent barrier beaches downdrift of the channel. These dredging activities are permitted, regulated, and coordinated by the U.S. Army, Corps of Engineers (COE) with the appropriate State and Federal resource agencies. Impacts from these operations are minimal due to 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 WPA proposed action is implemented or not, the proposed action would account for a small percentage of these impacts.

The WPA proposed action is not expected to adversely alter barrier beach configurations much beyond existing, ongoing impacts in localized areas downdrift of artificially jettied and maintained channels. The WPA proposed action may extend the life and presence of facilities in eroding areas through modifications to channel training structures (jetties) and the utilization of beach restoration and nourishment techniques combined with dune restoration. Strategic placement of dredged material from channel maintenance, channel deepening, and related actions can mitigate adverse impacts upon those localized areas. It is also highly unlikely that oil from the *Deepwater Horizon* explosion would be introduced by vessel traffic or channel maintenance due to the distance of the *Deepwater Horizon* explosion and oil spill from the Texas coast and decontamination procedures in place for boats that were inside of the containment booms. In addition, if encountered, the remnant oil is expected to be nontoxic due to natural weathering, microbial breakdown, and post-spill dispersant treatment.

Potential impacts from oil spills to barrier islands seaward of the barrier-dune system are discussed below, while potential impacts to barrier islands landward of the barrier-dune system are considered in the wetlands analysis. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on coastal barrier beaches and associated dunes can be found in Chapter 4.1.1.3.3 of the 2012-2017 WPA/CPA Multisale EIS.

Due to the proximity of inshore spills to barrier islands and beaches, inshore spills pose the greatest threat because of the concentration and lack of weathering of the oil by the time it hits the shore and because dispersants are not an effective means of spill response. Such spills may result from either vessel collisions that release fuel and lubricants or from pipelines that rupture. Impacts of a nearshore spill would be considered short term in duration and minor in scope because the size of such a spill is projected to be small (coastal spills are assumed to be 77 bbl; Chapter 3.2.1.7.1 of the 2012-2017 WPA/CPA Multisale EIS). Offshore-based crude oil would be lessened in toxicity when it reaches the coastal environments. This is due to the distance from shore, weathering, the time oil remains offshore, and the dispersant used. Equipment and personnel used in cleanup efforts can generate the greatest direct impacts to the area. Close monitoring and restrictions on the use of bottom-disturbing equipment would be needed to avoid or minimize those impacts.

Therefore, the currently available information suggests that impacts on barrier islands and beaches from accidental impacts associated with the WPA proposed action would be minimal. Should a spill other than a catastrophic spill 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 WPA proposed action. The WPA proposed action would not pose a significant increase in risk to barrier island or beach resources.

The cumulative analysis considers the effects of impact-producing factors related to the WPA proposed action, prior and future OCS sales in the Gulf of Mexico, State oil and gas activities, other governmental and private projects and activities, and pertinent natural processes that may affect barrier

beaches and dunes. Specific impact-producing factors considered in this cumulative analysis include channelization of the Mississippi River, beach protection and stabilization projects, natural processes, navigation channels, development and urbanization, oil spills, oil-spill-response and cleanup activities, pipeline landfalls, potential for nearshore salinity modifications (preparation of salt domes for oil storage), tourism, and recreational activities. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on coastal barrier beaches and associated dunes can be found in Chapter 4.1.1.3.4 of the 2012-2017 WPA/CPA Multisale EIS.

River channelization, sediment deprivation, tropical and extra-tropical storm activity, sea-level rise, and rapid submergence have resulted in severe, rapid erosion of most of the barrier and shoreline landforms along the Louisiana coast. The Texas coast has experienced landloss because of a decrease in the volume of sediment delivered to the coast because of channelization and damming of coastal rivers, a natural decrease in sediment supply as a result of climatic changes during the past several thousand years, and subsidence along the coast. Storm-induced changes in hydrology have, in some cases, changed the current regime responsible for stabilizing the barrier islands. Beach stabilization projects are considered by coastal geomorphologists and engineers to accelerate coastal erosion. Beneficial use of maintenance dredged materials and other restoration techniques could be required to mitigate some of these impacts.

The impacts of oil spills from both OCS and non-OCS sources to the Texas 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 Galveston have the greatest risks of sustaining impacts from oil-spill landfalls because of the high concentrations of oil production near that coast. However, the majority of inshore spills are assumed to be small in scale (historical data indicate they average 77 bbl; Chapter 3.2.1.7.1 of the 2012-2017 WPA/CPA Multisale EIS) and short in duration; therefore, impacts would be minor. Oil from most offshore spills is expected to be weathered and dissipated by the time it would contact coastal beaches. The cleanup impacts of these spills could result in short-term (up to 2 years) adjustment in beach profiles and configurations as a result of sand removal and disturbance during the cleanup operations. Some contact to lower areas of sand dunes is expected. These contacts would not result in significant destabilization of the dunes. All cleanup efforts would be monitored to ensure the least amount of disturbance to the areas. 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.

Under the cumulative scenario, 0-1 OCS-related pipeline landfalls are projected. These pipelines are expected to be installed using modern techniques, which cause little to no impacts to the barrier islands and beaches. 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 would continue to cause barrier beaches to narrow and breach.

Recreational use of many barrier beaches in the WPA is intense due to their accessibility by road. 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 (Texas), and county governments have made efforts through the Texas Coastal Erosion Planning and Response Act program and Coastal Management Plan programs to restore or protect the sensitive and vulnerable barrier islands and mainland beaches.

The WPA proposed action is not expected to adversely alter barrier beach configurations significantly beyond existing, ongoing impacts in localized areas downdrift of artificially jettied and maintained channels. The WPA proposed action may extend the life and presence of facilities in eroding areas, which would accelerate erosion in those areas. The WPA 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. Thus, the incremental contribution of the WPA proposed action to the cumulative impacts on coastal barrier beaches and associated dunes is expected to be small.

New Information Available Since the 2012-2017 WPA/CPA Multisale 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, CSA Illumina, and JSTOR) were checked for new information using general Internet searches based on major themes. No new significant information was discovered since publication of the 2012-2017 WPA/CPA Multisale EIS.

Coastal barrier beaches and associated dunes within the WPA were not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the best available information and the WPA's distance from the *Macondo* well. As identified in the resource analyses in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS, incomplete or unavailable information regarding coastal barrier beaches and associated dunes in the WPA may be relevant to reasonably foreseeable significant adverse effects. BOEM has determined that the information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for coastal barrier beaches and associated dunes presented in the 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 beaches and dunes presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.4. Wetlands

BOEM has reexamined the analysis for wetlands presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for wetlands presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of wetlands can be found in Chapter 4.1.1.4.1 of the 2012-2017 WPA/CPA Multisale EIS.

The primary impact-producing activities associated with the WPA proposed action that could affect wetlands and marshes include 0-1 pipeline emplacements, possible channel maintenance and construction, disposal of OCS-related wastes, increased vessel traffic, the use and construction of support infrastructure in these coastal areas. Other potential impacts that are indirectly associated with OCS oil and gas activities are wake erosion resulting from navigation traffic and additional onshore development encouraged by increased capacities of navigation channels. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on wetlands can be found in Chapter 4.1.1.4.2 of the 2012-2017 WPA/CPA Multisale EIS.

The WPA proposed action is projected to contribute to the construction of 0-1 new onshore pipelines. Modern pipelaying techniques and mitigations would be used for such a project. These modern pipelaying techniques use selective placement and directional drilling to avoid wetlands and to reduce the reliance on trenching and for required restoration; thus, the projected impact to wetlands from pipeline emplacement is expected to be negligible. Because of permit requirements, modern techniques, and mitigation, activities associated with the WPA proposed action are expected to cause negligible to low impacts to wetlands. Secondary impacts to wetlands caused by existing pipeline and vessel traffic

corridors will continue to cause landloss. Any potential impacts from the WPA proposed action would be reduced through the continued use of armored channels and modern erosion-control techniques.

The main accidental impact-producing factor that would affect wetlands is oil spills. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on wetlands can be found in Chapter 4.1.1.4.3 of the 2012-2017 WPA/CPA Multisale EIS.

Offshore oil spills resulting from the WPA proposed action are not expected to extensively damage any wetlands along the Gulf Coast. Wetland impacts from offshore spills would be minimized due to the distance of wells and production facilities to the coastal wetlands. In addition, the wetlands are provided protection by the barrier islands, peninsulas, sand spits, and currents. These factors, combined with the potential for only highly weathered or treated oil reaching the shoreline, greatly minimize or eliminate the impacts of offshore spills. However, if an inland oil spill related to the WPA proposed action occurs, some impact to wetland habitat would be expected. The effects from a spill have the highest probability of occurring in Galveston County and Matagorda County, Texas. These are the primary areas where oil produced in the WPA is transported and distributed, and they are west of Plaquemines and St. Bernard Parishes, Louisiana, where oil produced in the CPA is handled. Although the probability of occurrence is low, the greatest threat of an oil spill to wetland habitat is from an inland spill as a result of a vessel accident or pipeline rupture. Wetlands in the northern Gulf of Mexico are in moderate- to high-energy environments. Sediment transport and tidal stirring should reduce the chances of oil persisting in the event these areas are oiled. While a resulting slick may cause minor impacts to wetland habitat, the equipment and personnel used to clean up the spill can generate the greatest impacts to the area. Associated foot traffic can 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. Overall, impacts to wetland habitats from an oil spill associated with activities related to the WPA proposed action would be expected to be low and temporary.

The cumulative analysis considers the effects of impact-producing factors related to the WPA proposed action, State oil and gas activities, other governmental and private projects and activities, pertinent natural processes and events, and prior and future OCS activities that may adversely affect wetlands during the life of the WPA proposed action. Impacts from residential, commercial, agricultural, and silvicultural (forest expansion) developments are expected to continue in coastal regions around the Gulf. A detailed impact analysis of the cumulative impacts of non-OCS and OCS activities associated with proposed WPA Lease Sale 233 on wetlands can be found in Chapter 4.1.1.4.4 of the 2012-2017 WPA/CPA Multisale EIS.

Impacts from State onshore oil and gas activities are expected to occur as a result of dredging for new canals, maintenance, and usage of existing rig access canals and drill slips, and preparation of new well sites. Insignificant adverse impacts upon 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.

Development pressures in the coastal regions of Texas have been primarily the result of tourism and residential beachside development in the Galveston and Bolivar Peninsula areas. In Galveston, recreation and tourist developments have been particularly destructive. These trends are expected to continue, but since Hurricane Ike, redevelopment is being coordinated with the natural resource agencies in an effort to assure compatibility of the new construction with the coastal environment to minimize impacts. Groundwater extraction, drainage of wetland soils, and construction of buildings, roads, and levees have also caused the loss of wetlands.

Wetlands are most vulnerable to inshore or nearshore oil spills primarily localized in nature. Many such spills are from non-OCS sources, which can include vessel collisions, pipeline breaks, and shore-based transfer, refining, and production facilities. The wetlands associated with the WPA proposed action have a minimal probability for offshore oil-spill contact, as noted above. If any inshore spills occur, 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.

As a result of Hurricane Ike, some of the State and national wildlife refuges along the eastern Texas coast will continue to experience some landloss through storm-induced saltwater intrusion. However, coastal restoration projects are either ongoing or planned to restore the natural protection to the marshes in these refuges and management areas. Landloss will continue from vessel traffic; however, because of the minimal increase in traffic caused by the WPA proposed action, this loss would be minimal. The WPA proposed action will not require any additional channel maintenance; therefore, no additional

wetland loss would result from dredged material disposal. If dredged material disposal is required, it may be beneficially used for marsh creation. Disposal of OCS wastes and drilling by-products will be delivered to existing facilities. Because of existing capacity, no additional expansion into wetland areas is expected.

If pipelines are needed, the modern construction techniques and mitigation measures would result in zero to negligible impacts on wetland habitats because modern techniques avoid wetlands through selective emplacement in existing corridors, directional drilling to avoid additional trenching, and required restoration and revegetation techniques. The WPA proposed action represents a small (<5%) portion of the OCS impacts that will occur over the 40-year analysis period. Impacts associated with the WPA proposed action are a minimal part of the overall OCS impacts. 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 landloss. Wetland loss is also expected to continue in coastal Texas. The incremental contribution of the WPA proposed action to the cumulative impacts to coastal wetlands is expected to be small. The primary impacting factors attributable to the WPA proposed action are pipeline landfalls, canal widening, and maintenance dredging of navigation canals. However, activities associated with the WPA proposed action require no additional navigation canals; at most, it would require one new pipeline landfall and no increase in channel maintenance of existing channels. The use of existing onshore processing and transfer facilities and existing pipelines in established transportation corridors eliminates the need for dredging or construction activities that would cause additional wetland losses as a result of the WPA proposed action. The WPA proposed action would use existing disposal sites approved for receiving OCS related wastes; therefore, no additional wetlands would be needed for this purpose.

New Information Available Since the 2012-2017 WPA/CPA Multisale 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 Science Direct, Elsevier, CSA Illumina, and JSTOR) were checked for new information using general Internet searches based on major themes. No new significant information was discovered since publication of the 2012-2017 WPA/CPA Multisale EIS.

However, some recent research offered relevant insights. Silliman et al. (2012) found that after the *Deepwater Horizon* explosion, oil coverage of Louisiana salt marshes was primarily concentrated on their seaward edges. On these oiled marsh edges, erosion rates more than doubled. Eighteen months later erosion rates had returned to that of non-oiled areas. This new information does not change the conclusions of the 2012-2017 WPA/CPA Multisale EIS because such a catastrophic event is unlikely to occur and because BOEM has already considered the potential irreversible effects to marshes, such as erosion and permanent loss, in Appendix B (Section 5.2.2.6) of the 2012-2017 WPA/CPA Multisale EIS.

Wetlands within the WPA were likely not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the best available information and the WPA's distance from the *Macondo* well. As identified in the resource analyses in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS, incomplete or unavailable information regarding wetlands in the WPA may be relevant to reasonably foreseeable significant adverse effects. BOEM has determined that the information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for wetlands presented in the 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 wetlands presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.5. Seagrass Communities

BOEM has reexamined the analysis for seagrass communities presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for seagrass communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of seagrass communities can be found in Chapter 4.1.1.5.1 of the 2012-2017 WPA/CPA Multisale EIS.

The routine events associated with OCS activities in the WPA that could adversely affect submerged vegetation communities include construction of pipelines, canals, navigation channels, and onshore facilities; maintenance dredging; and vessel traffic (e.g., propeller scars). Many of these activities would result in an increase of water turbidity that is detrimental to submerged vegetation health. Through avoidance and mitigation policies, these effects are generally localized, short term, and minor in nature. A detailed impact analysis of the routine of OCS activities associated with proposed WPA Lease Sale 233 on seagrass communities can be found in Chapter 4.1.1.5.2 of the 2012-2017 WPA/CPA Multisale EIS.

Routine OCS activities in the WPA that may impact seagrasses are not predicted to significantly increase in occurrence and range in the near future, with minimal associated nearshore activities and infrastructure, such as the projected one new pipeline landfall expected as a result of the WPA proposed action. Requirements of other Federal and State programs, such as avoidance of the seagrass and vegetation communities or the use of turbidity curtains, reduce undesirable effects on submerged vegetation beds from dredging activities. These Federal and State permit requirements should ensure pipeline routes avoid high-salinity beds and should maintain water clarity and quality. Local programs decrease the occurrence of prop scarring in grass beds, and generally, channels used by OCS vessels are away from exposed submerged vegetation beds. Because of these requirements, implemented programs, along with the beneficial effects of natural flushing (e.g., from winds and currents), any potential effects from routine activities on seagrasses and submerged aquatic vegetation in the WPA are expected to be short term, localized, and not significantly adverse.

Impacts to submerged vegetation from routine activities of the WPA proposed action are expected to be minimal because of the distance of most activities from the submerged vegetation beds, because the 0-1 pipeline landfalls and maintenance dredging would be heavily regulated and permitted, and because mitigations (such as turbidity curtains and siting away from beds) would likely be required.

Accidental events possible with the WPA proposed action that could adversely affect submerged vegetation beds include nearshore and inshore spills connected with the transport and storage of oil. Offshore oil spills that occur in the WPA proposed action area are less likely to contact seagrass communities than are inshore spills because the seagrass beds are generally protected by barrier islands, peninsulas, sand spits, and currents. However, if the temporal and spatial duration of the spill is big enough, an offshore spill could affect submerged vegetation communities. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on seagrass communities can be found in Chapter 4.1.1.5.3 of the 2012-2017 WPA/CPA Multisale EIS.

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. The resulting slick may cause short-term and localized impacts to the bed. There is also the remote possibility of an offshore spill to such an extent that it could affect submerged vegetation beds, and this would have similar effects to an inshore spill. 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 decrease detrimental effects to submerged vegetation from the WPA proposed action.

There remains uncertainty regarding the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup on submerged vegetation in Louisiana, which is in the CPA. The *Macondo* well, however, was located more than 300 mi (483 km) from the eastern boundary of the WPA, and NOAA has estimated that the most western extent of visible sheens related to oil from the *Deepwater Horizon* explosion extended no farther than Cameron Parish, Louisiana, to the east of the WPA boundary (Figure 1-2 of the 2012-2017 WPA/CPA Multisale EIS). Data collected by the Operational Science Advisory Team (OSAT) indicate that the *Deepwater Horizon* oil spill did not reach WPA waters or sediments (OSAT, 2010). As such, seagrass and submerged aquatic vegetation communities in the WPA are not believed to have been impacted by the *Deepwater Horizon* explosion, oil spill, and cleanup; therefore, even though there is incomplete or unavailable information regarding the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup on seagrasses in Louisiana, this information is not essential to a reasoned choice among alternatives for the WPA proposed lease sale.

Impacts to submerged vegetation from an accidental event related to the WPA proposed action are expected to be minimal due to the distance of most activities from the submerged vegetation beds and because the likelihood of an accidental event of size, location, and duration reaching submerged vegetation beds remains small.

The cumulative activities that present the greatest threat of impacts to submerged vegetation communities are dredging, oil spills/pipelines, hydrological changes, and storm events. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on seagrass communities can be found in Chapter 4.1.1.5.4 of the 2012-2017 WPA/CPA Multisale EIS.

In general, the WPA proposed action would cause a minor incremental contribution to impacts on submerged vegetation from dredging, pipeline installations, potential oil spills, and boat scarring. Dredging generates the greatest overall risk to submerged vegetation, while naturally occurring hurricanes cause direct damage to beds. The implementation of proposed lease stipulations and mitigation policies currently in place, the small probability of an oil spill, and because flow regimes are expected to change further reduce the incremental contribution of stress from the WPA proposed action to submerged vegetation.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search was conducted for information published on submerged vegetation, and various Internet sources were examined to determine any recent information regarding seagrasses. Sources investigated include BOEM, USDOC/NOAA, 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, Elsevier, CSA Illumina, and JSTOR) were checked for new information using general Internet searches based on major themes. No new significant information was discovered since publication of the 2012-2017 WPA/CPA Multisale EIS.

Seagrass communities within the WPA were likely not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the best available information and the WPA's distance from the *Macondo* well. As identified in the resource analyses in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS, incomplete or unavailable information regarding seagrass communities in the WPA may be relevant to reasonably foreseeable significant adverse effects. BOEM has determined that the information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for seagrass communities presented in the 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 seagrass communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.6. Topographic Features

BOEM has reexamined the analysis for topographic features presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was

discovered that would alter the impact conclusion for topographic features presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of topographic features in the WPA can be found in Chapter 4.1.1.6.1 of the 2012-2017 WPA/CPA Multisale EIS.

The potential routine impact-producing factors on topographic features of the WPA are anchoring, infrastructure emplacement, drilling-effluent and produced-water discharges, and infrastructure removal. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on topographic features can be found in Chapter 4.1.1.6.2 of the 2012-2017 WPA/CPA Multisale EIS.

The proposed Topographic Features Stipulation, if applied, would prevent most of the potential impacts on topographic features from bottom-disturbing activities (structure removal and emplacement) and operational discharges associated with the WPA proposed action through avoidance, by requiring individual activities to be located at specified distances from a topographic feature or protective zone surrounding that feature. Because of the No Activity Zone, a buffer that surrounds topographic features in which no bottom disturbing activity is permitted, additional protective zones in which bottom shunting is required, permit restrictions (including the USEPA discharge regulations and permits), and the high-energy environment and prevailing water currents associated with topographic features, if any contaminants reach topographic features, they would be diluted from their original concentration, and impacts that do occur would be minimal.

Accidental disturbances resulting from the WPA proposed action, including oil spills and blowouts, have the potential to disrupt and alter the environmental, commercial, recreational, and aesthetic values of topographic features of the WPA. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on topographic features can be found in Chapter 4.1.1.6.3 of the 2012-2017 WPA/CPA Multisale EIS.

The proposed Topographic Features Stipulation would assist in preventing most of the potential impacts on topographic feature communities from blowouts, surface, and subsurface oil spills and the associated effects by increasing the distance of such events from the topographic features. It would be expected that the majority of subsurface released oil would rise 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. Any contact with spilled oil would likely cause sublethal effects to benthic organisms because the distance of activity would prevent contact with concentrated oil. In the unlikely event that diluted oil from a subsurface spill would 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, also 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 banks. The farther the oil source is from the bank, the more dilute and degraded the oil would be when it reaches the vicinity of the topographic features. In the event that oil from a subsurface spill reached an area containing hermatypic coral cover (e.g., the Flower Garden Banks, Stetson Bank, and McGrail Bank) in lethal concentrations, the recovery could take in excess of 10 years (Fucik et al., 1984). In addition, in the unlikely event a freighter, tanker, or other oceangoing vessel related to OCS Program activities or non-OCS-related activities sank and proceeded to collide with the topographic features or associated habitat releasing its cargo, recovery could take years to decades, depending on the extent of the damage. Because these events are rare in occurrence, the potential of impacts from these events is considered low.

The cumulative impact from routine oil and gas operations includes effects resulting from the WPA 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, blowouts, oil spills, and structure removal. Potential non-OCS-related factors include vessel anchoring, 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, commercial fishing, and recreational scuba diving. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on topographic features can be found in Chapter 4.1.1.6.4 of the 2012-2017 WPA/CPA Multisale EIS.

Activities causing mechanical disturbance represent the greatest threat to the topographic features. This would, however, be prevented by the continued application of the proposed Topographic Features Stipulation. Potential OCS-related impacts include anchoring of vessels and structure emplacement, operational discharges (drilling muds and cuttings, and produced waters), blowouts, oil spills, and structure removal.

The proposed Topographic Features Stipulation would preclude mechanical damage caused by oil and gas leaseholders from impacting the benthic communities of the topographic features and would protect them from operational discharges by establishing a buffer around the features. As such, little impact would be incurred by the biota of the topographic features. The USEPA discharge regulations and permits would further reduce discharge-related impacts.

Blowouts could potentially cause damage to benthic biota; however, due to the application of the proposed Topographic Features Stipulation, blowouts would not reach the No Activity Zone surrounding the topographic features and associated biota, resulting in little impact on the features. If a subsea oil plume is formed, it could contact the habitats of a topographic feature; this contact may be restricted to the lower, less sensitive levels of the banks and/or may be swept around the banks with the prevailing water currents. The farther the oil source is from the bank, the more dilute and degraded the oil would be when it reaches the vicinity of the topographic features.

Oil spills can cause damage to benthic organisms if the oil contacts the organisms. The proposed Topographic Features Stipulation would keep sources of OCS spills at least 152 m (500 ft) away from the immediate biota of the topographic features. 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 corals and much of the other fully developed biota. In the event that oil from a subsurface spill reached an area containing hermatypic coral cover (e.g., the Flower Garden Banks and Stetson Bank) in lethal concentrations, the recovery could take in excess of 10 years (Fucik et al., 1984). Finally, in the unlikely event a freighter, tanker, or other oceangoing vessel related to OCS Program activities or non-OCS oil- and gas-related activities sank and proceeded to collide with the topographic features or associated habitat releasing its cargo, recovery could take years to decades, depending on the extent of the damage. Because these events are rare in occurrence, the potential of impacts from these events is considered low.

Non-oil and gas OCS activities could mechanically disrupt the bottom (such as anchoring and treasure-hunting activities, as previously described). Natural events such as hurricanes or the collapse of the tops of the topographic features (through dissolution of the underlying salt structure) could cause severe impacts. The collapsing of topographic features is unlikely and would impact a single feature. Impacts from scuba diving, fishing, ocean dumping, and discharges or spills from tankering of imported oil could have detrimental effects on topographic features.

Overall, the incremental contribution of the WPA proposed action to the cumulative impact is negligible when compared with non-OCS oil and gas impacts. Where the proposed Topographic Features Stipulation is applied, mechanical impacts (anchoring and structure emplacement) and impacts from operational discharges (produced waters, drilling fluids, cuttings) or accidental discharges (oil spills, blowouts) would be removed from the immediate area surrounding the topographic features. However, if the stipulation is not applied, acute long-term injury to topographic features may occur as a result of the WPA proposed action.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of Internet information sources (the NOAA Gulf Spill Restoration Publications website, the 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), as well as recently published journal articles and Federal documents was conducted to determine the availability of recent information on topographic features. The search revealed new information on the proposed threatened/endangered listing of coral species in the GOM; information that is pertinent to this Supplemental EIS.

In 2009, a petition was submitted to NOAA Fisheries by the Center for Biological Diversity to list 82 additional species of coral under the ESA (USDOC, NOAA, 2012a). Those 82 "candidate species" were reviewed by NOAA Fisheries. In April 2012, NOAA Fisheries completed a Status Review Report and a Draft Management Report of the candidate species of corals, and on December 7, 2012, the Proposed Listing Determinations for 82 Reef-Building Coral Species and Proposed Reclassification of *Acropora palmata* and *Acropora cervicornis* from threatened to endangered was published in the *Federal Register* (2012b). The species that are proposed for listing as endangered and that are found on topographic features in the WPA (the Flower Garden Banks) include *Montastraea annularis*, *Montastraea faveolata*, and *Montastraea franksi*. Another coral that is found on the Flower Garden Banks that is proposed for listing as threatened is *Dichocoenia stokesii*. In addition, *Acropora palmata* is proposed to be upgraded from threatened to endangered. If these proposed species are listed, BOEM would consult with NOAA Fisheries under Section 7 of the ESA if an action may affect the listed species or designated critical habitat, as it currently does for other listed species.

Topographic features within the WPA were likely not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the best available information and the WPA's distance from the *Macondo* well. As identified in the resource analyses in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS, incomplete or unavailable information regarding topographic features in the WPA may be relevant to reasonably foreseeable significant adverse effects. BOEM has determined that the information is not essential to a reasoned choice among alternatives.

Summary and Conclusion

BOEM has reexamined the analysis for topographic features presented in the 2012-2017 WPA/CPA Multisale EIS, with the understanding that no new information on topographic features has been published since the release of the 2012-2017 WPA/CPA Multisale EIS. Therefore, no new significant information was discovered that would alter the impact conclusion for topographic features presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.7. Sargassum *Communities*

BOEM has reexamined the analysis for *Sargassum* communities presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for *Sargassum* communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of *Sargassum* communities can be found in Chapter 4.1.1.7.1 of the 2012-2017 WPA/CPA Multisale EIS.

Impact-producing factors associated with routine events for the WPA proposed action that could affect *Sargassum* may include the following: drilling discharges (muds and cuttings); produced water and well treatment chemicals; operational discharges (deck drainage, sanitary and domestic water, bilge and ballast water); and physical disturbance from vessel traffic and the presence of exploration and production structures (i.e., rigs, platforms, and MODU's). A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on *Sargassum* communities can be found in Chapter 4.1.1.7.2 of the 2012-2017 WPA/CPA Multisale EIS.

Sargassum, as pelagic algae, is a widely distributed resource that is found throughout the Gulf of Mexico and northwest Atlantic. Considering its ubiquitous distribution and occurrence in the upper water column near the sea surface, it may be contacted by routine discharges from oil and gas operations. All routine discharges, including produced water, and operational discharges (e.g., deck runoff, bilge water, sanitary effluent, etc.) could potentially contact *Sargassum* algae. However, the quantity and volume of these discharges is relatively small compared with the pelagic waters of the WPA (115,645 km^2;

44,651 mi^2). Therefore, although discharges would contact *Sargassum*, they would only contact a very small portion of the *Sargassum* population. Because these discharges are highly regulated to control toxicity and because they would continue to be diluted in the Gulf water, concentrations of any toxic components would be reduced; therefore, produced-water impacts on *Sargassum* would be minimum.

The impingement effects of discharges by service vessels and working platforms and drillships would contact only a very small portion of the *Sargassum* population. The impacts to *Sargassum* that are associated with the WPA proposed action are expected to have only minor effects to a small portion of the *Sargassum* community as a whole and would be resilient to the minor effects predicted. *Sargassum* has a yearly cycle that promotes quick recovery from impacts. No measurable impacts are expected to the overall population of the *Sargassum* community.

Impact-producing factors associated with accidental events that may be associated with the WPA proposed action that could affect *Sargassum* and its associated communities include surface oil and fuel spills and underwater well blowouts, spill-response activities, and 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. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on *Sargassum* communities can be found in Chapter 4.1.1.7.3 of the 2012-2017 WPA/CPA Multisale EIS.

All types of spills, including surface oil and fuel spills, underwater well blowouts, and chemical spills, could potentially contact *Sargassum* algae. The quantity and volume of most of these spills would be relatively small compared with the pelagic waters of the WPA (115,645 km^2; 44,651 mi^2). Therefore, most spills would only contact a very small portion of the *Sargassum* population. Accidental spills would likely be diluted by the Gulf water and, therefore, concentrations of toxic components would also be reduced in this scenario. The impacts to *Sargassum* that are associated with the WPA proposed action are expected to have only minor effects to a small portion of the *Sargassum* community unless a catastrophic spill occurs. In the case of a very large spill, the *Sargassum* algae community could suffer severe impacts to a sizable portion of the population in the northern Gulf. The *Sargassum* community 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 cycle that promotes quick recovery from impacts. No measurable impacts are expected to the overall population of the *Sargassum* community unless a catastrophic spill occurs.

Cumulative impacting factors that can affect *Sargassum* include impingement by structures and marine vessels, oil and gas drilling discharges, operational discharges, accidental spills, hurricanes, and coastal water quality. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on *Sargassum* communities can be found in Chapter 4.1.1.7.4 of the 2012-2017 WPA/CPA Multisale EIS.

Because of the ephemeral (temporary) nature of *Sargassum* communities, many activities associated with the WPA proposed action would have a localized and short-term effect. *Sargassum* occurs seasonally in almost every part of the northern Gulf, resulting in a wide distribution over a very large area. However, its occurrence is patchy, drifting in floating mats that are occasionally impinged on ships and on oil and gas structures. The large, scattered, patchy distribution results in only a small portion of the total population contacting ships, structures, or drilling discharges. There is also a low probability of a catastrophic spill to occur with the WPA proposed action. If such a spill did occur, *Sargassum* in that area is expected to suffer mortality. Offshore activities other than oil and gas activities also have the potential to affect *Sargassum* algae. Shipping traffic would be the largest non-oil and gas activity to impact *Sargassum*. Impingement, routine discharges, and accidental spills could all affect *Sargassum*. However, because of the wide, patchy distribution of *Sargassum*, these activities would have only localized effects. The incremental contribution of the WPA proposed action to the overall cumulative impacts on *Sargassum* communities that would result from the OCS Program, environmental factors, and non-OCS-related user group activities is expected to be minimal.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A broad Internet search for relevant new information and scientific journal articles published since the publication of the 2012-2017 WPA/CPA Multisale EIS was conducted using a publicly available search engine. The websites for Federal and State agencies, as well as other organizations were reviewed for newly released information. Sources investigated include the South Atlantic Fishery Management Council, the Gulf of Mexico Alliance, USEPA, USGS, and coastal universities. Ongoing research

projects funded by NOAA and the National Science Foundation are investigating *Sargassum* communities and impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup. No new analyses have been published since the 2012-2017 WPA/CPA Multisale EIS.

Sargassum communities within the WPA were likely not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the best available information and the WPA's distance from the *Macondo* well. As identified in the resource analyses in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS, there remains incomplete or unavailable information on the effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on *Sargassum* that may be relevant to reasonably foreseeable significant adverse impacts. BOEM has determined that the information is not essential to a reasoned choice among alternatives because *Sargassum* is widely distributed throughout the Gulf and because the yearly cycle of replenishment for *Sargassum* indicates that impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup would be significantly reduced or eliminated within a year or two. Available scientifically credible information has been applied by BOEM's subject-matter experts using accepted scientific methodologies.

Summary and Conclusion

BOEM has reexamined the analysis for *Sargassum* communities presented in the Multisale 2012-2017 EIS, based on the additional information presented above. No new significant information was discovered that would alter the impact conclusion for *Sargassum* communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.8. Chemosynthetic Deepwater Benthic Communities

BOEM has reexamined the analysis for chemosynthetic communities presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for chemosynthetic communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of chemosynthetic communities can be found in Chapter 4.1.1.8.1 of the 2012-2017 WPA/CPA Multisale EIS.

Considerable mechanical damage could be inflicted upon deepwater chemosynthetic communities by routine OCS drilling activities associated with the WPA proposed action if mitigations are not applied. 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. 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 described by NTL 2009-G40. A detailed description of the possible impacts on chemosynthetic communities from routine activities associated with the WPA proposed action is presented below. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on chemosynthetic communities can be found in Chapter 4.1.1.8.2 of the 2012-2017 WPA/CPA Multisale EIS.

Chemosynthetic communities are susceptible to physical impacts from anchoring, structure emplacement, pipeline installation, structure removal, and drilling discharges. The policies described in NTL 2009-G40 greatly reduce the risk of these physical impacts by requiring the avoidance of potential chemosynthetic communities. 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.

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), although it may reappear relatively quickly once the process begins, as in the case of a mussel community (Powell, 1995; Fisher, 1995). Tube-worm communities may be the most sensitive of all communities because of the combined requirements of hard substrate and active hydrocarbon seepage.

Routine activities of the WPA proposed action are expected to cause little 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 oil and gas activities in deep water because the impacts would be limited by standard BOEM protections as described in NTL 2009-G40. Impacts on chemosynthetic communities from routine activities associated with the WPA proposed action would be minimal to none.

Accidental events that could impact chemosynthetic communities are primarily limited to seafloor blowouts. A blowout at the seafloor could create a crater and could resuspend and disperse large quantities of bottom sediments within a 300-m (984-ft) radius from the blowout site. This could bury organisms located within that distance to some degree. The application of avoidance criteria for chemosynthetic communities described in NTL 2009-G40 precludes the placement of a well within 610 m (2,000 ft) of any suspected site of a chemosynthetic community, therefore distancing the chemosynthetic community from sedimentation resulting from a possible blowout. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on chemosynthetic communities can be found in Chapter 4.1.1.8.3 of the 2012-2017 WPA/CPA Multisale EIS.

Chemosynthetic communities could be susceptible to physical impacts from a blowout depending on bottom-current conditions. The guidance provided in NTL 2009-G40 greatly reduces the risk of these physical impacts by requiring a buffer of 610 m (2,000 ft) from wells. It requires avoidance of potential chemosynthetic communities identified on the required geophysical survey records prior to approval of the structure emplacement. The 610-m (2,000-ft) avoidance required would protect sensitive communities from heavy sedimentation, with only light sediment components able to reach 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, particularly if hard substrate required for recolonization is buried by resuspended sediments from a blowout.

Potential accidental impacts from the WPA proposed action are expected to cause little damage to the ecological function or biological productivity of chemosynthetic communities located at more than 610 m (2,000 ft) away from a blowout. Chemosynthetic communities could experience minor impacts from resuspended sediments that travel with currents, although the sediment concentration would be diluted with distance from the well. 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 it will become as it mixes with surrounding water.

Accidental impacts associated with the WPA proposed action would likely result in only minimal impacts to chemosynthetic communities with adherence to the proposed biological stipulation and the guidelines described in NTL 2009-G40. One exception would be in the case of a 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.

Cumulative factors considered to impact the deepwater benthic communities (>300 m; 984 ft) of the Gulf of Mexico include both oil- and gas-related and non-oil- and non-gas-related activities. The latter type of impacting factors include activities such as fishing and trawling at a relatively small scale, and

large-scale factors such as storm impacts and climate change. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on chemosynthetic communities can be found in Chapter 4.1.1.8.4 of the 2012-2017 WPA/CPA Multisale EIS.

Cumulative impacts to deepwater communities in the Gulf of Mexico are considered negligible because of their remoteness from most impacts and because of the application of BOEM's avoidance criteria as described in NTL 2009-G40. 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-related activities associated with pipelaying, anchoring, structure emplacement, and seafloor blowouts. Drilling discharges and resuspended sediments have a potential to cause minor, mostly sublethal impacts to chemosynthetic communities, but substantial accumulations could result in more serious impacts. Possible catastrophic oil spills due to seafloor blowouts have the potential to devastate localized deepwater benthic habitats. However, these events are rare and would only affect a small portion of the sensitive benthic habitat in the Gulf of Mexico. Recent analyses reveal over 21,000 possible hard-bottom locations across the deepwater GOM (Shedd et al., 2011). Guidance provided in NTL 2009-G40 describes required surveys and avoidance prior to drilling or pipeline installation and would greatly reduce risk. Recent studies have refined predictive information and confirmed the effectiveness of these provisions throughout all depth ranges of the Gulf of Mexico (Brooks et al., 2009). With the dramatic success of this project, confidence is increasing regarding the use of geophysical signatures for the prediction of chemosynthetic communities.

Activities unrelated to the OCS Program include fishing and trawling. Because of the water depths in these areas (>300 m; 984 ft) and the low density of potentially commercially valuable fishery species, these activities are not expected to impact deepwater benthic communities. Regionwide and even global impacts from CO_2 build-up and proposed methods to sequester carbon in the deep sea (e.g., ocean fertilization) are not expected to have major impacts to deepwater habitats in the near future. More distant scenarios could include severe impacts.

The proposed activities in the WPA considered under the cumulative scenario are expected to cause little damage to the ecological function or biological productivity of widely scattered, high-density chemosynthetic communities. They could experience isolated minor impacts from drilling discharges or resuspended sediments, with recovery expected within several years, but even minor impacts are not expected. Major impacts to localized benthic habitat are possible in the event of a catastrophic blowout on the seafloor, particularly when chemical dispersants are applied to oil releases at depth or if oil is ejected under high pressure. If physical disturbance (such as anchor damage) or extensive burial by muds and cuttings were to occur to high-density communities, impacts could be severe, with recovery time as long as 200 years for mature tube-worm communities. There is evidence that substantial impacts on these communities could permanently prevent reestablishment. Other sublethal impacts include possible incremental losses of productivity, reproduction, community relationships, overall ecological functions of the community, and incremental damage to ecological relationships with the surrounding benthos.

The incremental contribution of the WPA proposed action to cumulative impacts is expected to be slight and to result from the effects of the possible impacts caused by physical disturbance of the seafloor and minor impacts from sediment resuspension or drill cutting discharges. Adverse impacts will be limited but not completely eliminated by adherence to the guidelines described in NTL 2009-G40.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A broad Internet search for relevant new information and scientific journal articles published since the publication of the 2012-2017 WPA/CPA Multisale EIS was conducted using a publicly available search engine. The websites for Federal and State agencies, as well as other organizations were reviewed for newly released information. Sources investigated include the NOAA Ocean Exploration website, the Gulf of Mexico Alliance, USEPA, USGS, and coastal universities. Ongoing research projects funded by NOAA and the National Science Foundation are investigating chemosynthetic communities and impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup. No new analyses that are relevant to deepwater chemosynthetic communities and that would impact those analyses or conclusions have been published since publication of the 2012-2017 WPA/CPA Multisale EIS.

Deepwater chemosynthetic communities within the WPA were likely not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the best available

information and the WPA's distance from the *Macondo* well. As identified in the resource analyses in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS, there remains incomplete or unavailable information on the effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on chemosynthetic communities that may be relevant to reasonably foreseeable significant adverse impacts. BOEM has determined that the information is not essential to a reasoned choice among alternatives because chemosynthetic communities are found throughout the Gulf 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.

Summary and Conclusion

BOEM has reexamined the analysis for chemosynthetic communities presented in the 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 chemosynthetic communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.9. Nonchemosynthetic Deepwater Benthic Communities

BOEM has reexamined the analysis for nonchemosynthetic communities presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for nonchemosynthetic communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of nonchemosynthetic communities can be found in Chapter 4.1.1.9.1 of the 2012-2017 WPA/CPA Multisale EIS.

Considerable mechanical damage could be inflicted upon sensitive nonchemosynthetic deepwater benthic communities by routine OCS drilling activities associated with the WPA proposed action if mitigations are not applied. Deepwater live bottom communities, primarily structured by the coral *Lophelia pertusa*, are the nonchemosynthetic deepwater benthic communities that would be sensitive to impacts from oil and gas activities. Bottom-disturbing activities associated with anchoring, structure emplacement, pipelaying, and structure removal cause localized bottom disturbances and disruption of benthic communities in the localized areas. Routine discharge of drill cuttings with associated muds can also affect the seafloor. 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 deepwater coral communities are expected to be extremely rare because of the application of required protective measures described by NTL 2009-G40. A detailed description of the possible impacts on deepwater coral communities from routine activities associated with the WPA proposed action is presented below. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on nonchemosynthetic communities can be found in Chapter 4.1.1.9.2 of the 2012-2017 WPA/CPA Multisale EIS.

Deepwater nonchemosynthetic communities are susceptible to physical impacts from anchoring, structure emplacement, pipeline installation, structure removal, and drilling discharges. The policies described in NTL 2009-G40 greatly reduce the risk of these physical impacts by requiring the avoidance of potential sensitive benthic communities.

Some impact to soft bottom benthic communities from drilling and production activities would occur as a result of physical impacts and drilling discharges regardless of their locations. However, even in situations where the substantial burial of typical, soft bottom benthic infaunal communities occurred, recolonization of populations from widespread neighboring soft bottom substrate would be expected over a relatively short period of time for all size ranges of organisms.

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 in 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).

Routine activities associated with the WPA proposed action are expected to cause no damage to the ecological function or biological productivity of deepwater live bottom communities (deep coral reefs) due to the consistent application of BOEM protection policies as described in NTL 2009-G40. Information included in required hazards surveys for oil and gas 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 deepwater live bottom communities. Because of the NTL 2009-G40 guidelines, these communities are generally avoided in exploration and development planning and bottom-disturbing activities. Impacts on sensitive deepwater communities from routine activities associated with the WPA proposed action would be minimal to none.

Accidental events that could impact nonchemosynthetic deepwater benthic communities are primarily limited to seafloor blowouts. A blowout at the seafloor could create a crater and could resuspend and disperse large quantities of bottom sediments within a 300-m (984-ft) radius from the blowout site. This would destroy any organisms located within that distance by burial or modification of narrow habitat quality requirements. 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 described in NTL 2009-G40 precludes the placement of a well within 610 m (2,000 ft) of any suspected site of a deepwater coral community, therefore distancing the deepwater coral community from sedimentation resulting from a possible blowout. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on nonchemosynthetic communities can be found in Chapter 4.1.1.9.3 of the 2012-2017 WPA/CPA Multisale EIS.

Deepwater live bottom communities could be susceptible to physical impacts from a blowout depending on bottom-current conditions. The guidance provided in NTL 2009-G40 and proposed stipulations included in lease sales greatly reduce the risk of these physical impacts. The NTL 2009-G40 clarifies the requirement to avoid potential, deepwater live bottom communities identified on the required geophysical survey records prior to approval of the structure emplacement. Substantial impacts on these communities could permanently prevent reestablishment, particularly if hard substrate required for recolonization is buried by resuspended sediments from a blowout.

Accidental events resulting from the WPA proposed action are likely to cause localized damage to the ecological function or biological productivity of widespread, typical, soft bottom benthic communities, with no measurable effect on the wider ecosystem. Some localized impact to benthic communities would likely occur as a result of impact from an accidental blowout. Megafauna and infauna communities at or below the sediment/water interface would be impacted by the physical disturbance of a blowout or by burial from resuspended sediments. Even in situations where the substantial burial of typical soft benthic communities occurred, recolonization by populations from neighboring substrate would be expected over a relatively short period for all size ranges of organisms; this can be in a matter of hours to days for bacteria and about 1-2 years for macrofauna species.

Impacts to deepwater coral habitats and other potential hard-bottom communities will likely be avoided as a consequence of the application of the policies described in NTL 2009-G40. The rare, widely scattered, high-density, deepwater live bottom communities located at more than 610 m (2,000 ft) away from a blowout could experience minor impacts from resuspended sediments that travel with currents, although the sediment concentration would be diluted with distance from the well. If dispersants are applied to an oil spill, or if oil is ejected under high pressure, oil could mix into the water column, be carried by underwater currents, and eventually contact the seafloor where it may impact patches of sensitive deepwater community habitat in its path. As with sediments, the farther the dispersed oil

travels, the more diluted it will become as it mixes with the surrounding water. These potential impacts would be localized due to the directional movement of oil plumes by the water currents because the sensitive habitats have a scattered and patchy distribution, because the sediments and oil disperse with distance, and because bacteria degrade the oil over time (and distance).

Accidental impacts associated with the WPA proposed action would likely result in only minimal impacts to nonchemosynthetic communities with adherence to the guidelines described in NTL 2009-G40. One exception would be in the case of a catastrophic spill combined with the application of dispersant, or if oil is ejected under high pressure, producing the potential to cause devastating effects on local patches of habitat in the path of subsea plumes where they physically contact the seafloor. If such an event were to occur, it could take hundreds of years to reestablish the chemosynthetic community in that location. 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.

Cumulative factors considered to impact the deepwater benthic communities (>300 m; 984 ft) of the Gulf of Mexico include both oil- and gas-related and non-oil- and non-gas-related activities. The latter type of impacting factors includes activities such as fishing and trawling at a relatively small scale, and large-scale factors such as storm impacts and climate change. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on nonchemosynthetic communities can be found in Chapter 4.1.1.9.4 of the 2012-2017 WPA/CPA Multisale EIS.

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. 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-related activities associated with pipelaying, anchoring, structure emplacement, and seafloor blowouts. Drilling discharges and resuspended sediments have a potential to cause minor, mostly sublethal impacts to nonchemosynthetic communities, but substantial accumulations could result in more serious impacts. Seafloor disturbance is considered to be a threat only to the high-density communities; widely distributed low-density communities would not be at risk because drilling discharges rapidly settle out of the water column and do not travel far distances, reducing the probability of contact with widely distributed low-density patches. Possible catastrophic oil spills due to seafloor blowouts have the potential to devastate localized deepwater benthic habitats. However, these events are rare and would only affect a small portion of the sensitive benthic habitat in the Gulf of Mexico. Recent analyses reveal over 21,000 possible hard-bottom locations across the deepwater GOM (Shedd et al., 2011). Guidance provided in NTL 2009-G40 describes required surveys and avoidance prior to drilling or pipeline installation and will greatly reduce risk. Recent studies have refined predictive information and confirmed the effectiveness of these provisions throughout all depth ranges of the Gulf of Mexico (Brooks et al., 2009). With the dramatic success of this project, confidence is increasing regarding the use of geophysical signatures for the prediction of nonchemosynthetic communities.

Activities unrelated to the OCS Program include fishing and trawling. Because of the water depths in these areas (>300 m; 984 ft) and the low density of potentially commercially valuable fishery species, these activities are not expected to impact deepwater benthic comminutes. Regionwide and even global impacts from CO_2 build-up and proposed methods to sequester carbon in the deep sea (e.g., ocean fertilization) are not expected to have major impacts to deepwater habitats in the near future. More distant scenarios could include severe impacts.

The proposed activities in the WPA considered under the cumulative scenario are expected to cause no damage to the ecological function or biological productivity of widespread, low-density deepwater communities. The rarer, widely scattered, high-density communities could experience isolated minor impacts from drilling discharges or resuspended sediments, with recovery expected within several years, but even minor impacts are not expected. Major impacts to localized benthic habitat are possible in the event of a catastrophic blowout on the seafloor, particularly when chemical dispersants are applied to oil releases at depth or when oil is ejected under high pressure, forming subsea oil plumes. If physical disturbance (such as anchor damage) or extensive burial by muds and cuttings were to occur to high-density communities, impacts could be severe, with recovery time as long as 200 years for mature communities. There is evidence that substantial impacts on these communities could permanently prevent

reestablishment. Other sublethal impacts include possible incremental losses of productivity, reproduction, community relationships, overall ecological functions of the community, and incremental damage to ecological relationships with the surrounding benthos.

The cumulative impacts on nonchemosynthetic benthic communities are expected to cause little damage to the ecological function or biological productivity of the expected typical communities existing on sand/silt/clay bottoms of the deep Gulf of Mexico. Large motile animals would tend to move, and recolonization of populations from neighboring substrates would be expected in any areas impacted by burial. The cumulative impacts on deepwater coral or other high-density, hard-bottom communities are expected to be negligible and to cause little damage to the overall ecological function or biological productivity.

The possible impacts to these communities are decreased through BOEM's biological review process and the policies described in NTL 2009-G40, which physically distances petroleum-producing activities from sensitive deepwater benthic communities. The incremental contribution of the WPA proposed action to cumulative impacts is expected to be slight and to result from the effects of the possible impacts caused by physical disturbance of the seafloor and minor impacts from sediment resuspension or drill cutting discharges. Adverse impacts will be limited but not completely eliminated by adherence to the guidelines described in NTL 2009-G40.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A broad Internet search for relevant new information and scientific journal articles published since the publication of the 2012-2017 WPA/CPA Multisale EIS was conducted using a publicly available search engine. The websites for Federal and State agencies, as well as other organizations were reviewed for newly released information. Sources investigated include the NOAA Ocean Exploration website, the Gulf of Mexico Alliance, USEPA, USGS, and coastal universities. Ongoing research projects funded by NOAA and the National Science Foundation are investigating nonchemosynthetic communities and impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup. No new analyses that are relevant to the above analysis have been published since the publication of the 2012-2017 WPA/CPA Multisale EIS.

Nonchemosynthetic communities within the WPA were likely not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the best available information and the WPA's distance from the *Macondo* well. As identified in the resource analyses in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS, there remains incomplete or unavailable information on the effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on deepwater live bottom communities that may be relevant to reasonably foreseeable significant adverse impacts. BOEM has determined that the information is not essential to a reasoned choice among alternatives because deepwater live bottom communities are found throughout the Gulf 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.

Summary and Conclusion

BOEM has reexamined the analysis for nonchemosynthetic communities presented in the 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 nonchemosynthetic communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.10. Soft Bottom Benthic Communities

BOEM has reexamined the analysis for soft bottom benthic communities presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of soft bottom benthic communities in the WPA can be found in Chapter 4.1.1.10.1 of the 2012-2017 WPA/CPA Multisale EIS.

Impacts from routine oil and gas activities to the soft bottom benthic communities are discussed in this section, as a majority of the oil and gas exploration would be conducted in soft seafloor sediments. Impacts to these communities include infrastructure emplacement, turbidity and smothering, drilling-effluent and produced-water discharges, and infrastructure removal. Disturbances of soft bottom benthic communities may cause localized disruptions to food sources for some large invertebrate and finfish species. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on soft bottom benthic communities can be found in Chapter 4.1.1.10.2 of the 2012-2017 WPA/CPA Multisale EIS.

Impacts from routine activities of OCS oil and gas operations include anchoring, structure emplacement and removal, pipeline emplacement, drilling discharges, and discharges of produced waters. Although localized impacts to comparatively small areas of the soft bottom benthic communities would occur as a result of routine oil and gas activity on the OCS, the impacts would be on a relatively small area of the seafloor compared with the overall area of the seafloor of the WPA (115,645 km^2; 44,651 mi^2) and the WPA and CPA combined (384,567 km^2; 148,482 mi^2). The estimated footprint of platforms on the continental shelf in the GOM is approximately 20,170,839 ft^2 (1.874 km^2; 0.724mi^2) (LGL Ecological Research Associates, Inc. and Science Applications International Corporation, 1998), which is 0.0005 percent of the estimated area of seafloor in the WPA and CPA combined. Based on these values, the impacts that may occur to the seafloor around platforms would be a fraction of the entire soft bottom community of the GOM. The greatest impact is the alteration of benthic communities as a result of smothering, chemical toxicity, and substrate change. Communities that are smothered by cuttings would be taken over by more tolerant species. The community alterations are not so much the introduction of a new benthic community as a shift in species dominance (Montagna and Harper, 1996). These localized impacts generally occur within a few hundred meters of platforms, and the greatest impacts are seen close to the platform. These patchy habitats within the Gulf of Mexico are probably not very different from the early successional communities that predominate throughout areas of the Gulf of Mexico that are frequently disturbed (Rabalais et al., 2002a; Gaston et al., 1998; Diaz and Solow, 1999).

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, NPDES permits). A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on soft bottom benthic communities can be found in Chapter 4.1.1.10.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental subsea oil spills or blowouts associated with OCS activities can cause damage to infaunal communities. Because of the small amount of proportional space that OCS activities occupy on the seafloor, only a very small portion of the seafloor of the Gulf of Mexico would experience lethal impacts as a result of blowouts, surface, and subsurface oil spills and the associated affects. The greatest impacts would be closest to the spill, and impacts would decrease with distance from the spill. Contact with spilled oil at a distance from the spill would likely cause sublethal to immeasurable effects to benthic organisms because the distance of activity would prevent contact with concentrated oil. Oil from a subsurface spill that eventually reaches benthic communities would be primarily sublethal, and impacts would be at the local community level. Any sedimentation and deposition of oil adhered to sediment would also be at low concentrations and widely dispersed by the time it reaches the seafloor, also resulting in sublethal impacts. Also, any local communities that are lost would be repopulated fairly rapidly (Neff, 2005). Although an oil spill may have some detrimental impacts, especially closest to the occurrence of the spill, the impacts may be no greater than natural biological fluctuations (Clark, 1982), and impacts would be to an extremely small portion of the overall Gulf of Mexico.

This cumulative analysis considers the effects of impact-producing factors related to soft bottoms of the Gulf of Mexico continental shelf. The WPA proposed action plus those activities related to prior and

future OCS lease sales are considered; in this discussion, these are referred to as "OCS-related" factors. Other impacting factors that may occur and adversely affect soft bottom benthic communities include shipping operations, cable and pipeline laying, bottom trawling, hypoxia (low oxygen levels ≤2 ppm), and storm events. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on soft bottom benthic communities can be found in Chapter 4.1.1.10.4 of the 2012-2017 WPA/CPA Multisale EIS.

Non-OCS oil and gas activities that may occur on soft bottom benthic substrate include recreational boating and fishing, commercial fishing, import tankering, and natural events such as extreme weather conditions, and extreme fluctuations of environmental conditions. These activities could cause temporary damage to soft bottom communities. Ships and fishermen anchoring on soft bottoms could crush and smother underlying organisms. Activities of the commercial shrimp fishery regularly disturb large areas of the continental shelf and is a substantial disturbance in the Gulf of Mexico. During severe storms, such as hurricanes, large waves may stir bottom sediments, which cause scouring, remobilization of contaminants in the sediment, abrasion and clogging of gills as a result of turbidity, uprooting benthic organisms from the sediment, and an overall result in decreased species diversity (Engle et al., 2008; Dobbs and Vozarik, 1983). Yearly hypoxic events may eliminate many species from benthic populations over a wide area covering most of the CPA and part of the WPA continental shelf (Rabalais et al., 2002b).

Long-term OCS oil and gas activities are not expected to adversely impact the entire soft bottom environment of the GOM because the local impacted areas are extremely small compared with the entire seafloor of the GOM, and because impacted communities are repopulated relatively quickly. Impacts from blowouts, pipeline emplacement, muds and cuttings discharges, other operational discharges, and structure removals may have local devastating impacts, but the cumulative effect on the overall seafloor and infaunal communities on the GOM would be very small. Soft bottom benthic communities are ubiquitous throughout and often remain in an early successional stage due to natural fluctuation, and therefore, the activities of OCS production of oil and gas would not cause additional severe cumulative impacts.

The incremental contribution of the WPA proposed action to the cumulative impact is expected to be slight, with possible impacts from physical disturbance of the bottom, discharges of drilling muds and cuttings, other OCS oil and gas discharges, structure removals, and oil spills. Negative impacts, however, are small compared with the overall size and ubiquitous composition of the soft bottom benthic communities in the Gulf of Mexico. Non-oil and gas factors, such as storms, trawling, non-OCS oil- and gas-related spills, and hypoxia, are likely to impact the soft bottom communities on a more frequent basis. Impacts from OCS oil and gas activities are also somewhat minimized by the fact that these communities are ubiquitous throughout the WPA and can recruit quickly from neighboring areas.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of Internet information sources (the NOAA Gulf Spill Restoration Publications website; the ERMA Gulf Response website; the NOAA *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), as well as recently published journal articles was conducted to determine the availability of recent information on soft bottom benthic communities. The search revealed no new information pertinent to this analysis.

Soft bottom benthic communities within the WPA were likely not affected to any discernible degree by the *Deepwater Horizon* explosion, oil spill, and cleanup, based on the best available information and the WPA's distance from the *Macondo* well. As identified in the resource analyses in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS, incomplete or unavailable information regarding soft bottom benthic communities in the WPA may be relevant to reasonably foreseeable significant adverse effects. BOEM has determined that the information is not essential to a reasoned choice among alternatives for the reasons stated therein.

Summary and Conclusion

BOEM has reexamined the analysis for soft bottom benthic communities presented in the 2012-2017 WPA/CPA Multisale EIS, with the understanding that no new information on these habitats has been published since the release of the 2012-2017 WPA/CPA Multisale EIS. Therefore, no new significant

information was discovered that would alter the impact conclusion for soft bottom benthic communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.11. Marine Mammals

BOEM has reexamined the analysis for marine mammals presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for marine mammals presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of marine mammals can be found in Chapter 4.1.1.11.1 of the 2012-2017 WPA/CPA Multisale EIS.

The potential effects on marine mammal species may occur from routine activities associated with the WPA proposed action. The major impact-producing factors affecting marine mammals as a result of routine OCS activities include 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 structures. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on marine mammals can be found in Chapter 4.1.1.11.2 of the 2012-2017 WPA/CPA Multisale EIS.

Some routine activities related to the WPA proposed action have the potential to have adverse, but not significant, impacts to marine mammal populations in the GOM. Impacts from vessel traffic, structure removals, and seismic activity could negatively impact marine mammals; however, when mitigated as required by BOEM and NMFS, these activities are not expected to have long-term impacts on the size and productivity of any marine mammal species or population. Most other routine activities are expected to have negligible effects.

Accidental, unexpected events associated with the WPA proposed action could negatively impact marine mammals. Such impacts would primarily be the result of blowouts, oil spills, and spill-response activities. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on marine mammals can be found in Chapter 4.1.1.11.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events related to the WPA proposed action have the potential to have adverse, but not significant, impacts to marine mammal populations in the Gulf of Mexico. Accidental blowouts, oil spills, and spill-response activities may impact marine mammals in the Gulf of Mexico. 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 mammals. Long-term effects include decreases in prey availability and abundance because of increased 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 the spill is stopped, oilings or deaths of marine mammals would still occur due to 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.

The cumulative analysis considers past, ongoing, and foreseeable future human and natural activities that may occur and adversely affect marine mammals in the same general area that may be affected by the WPA proposed action. The major potential impact-producing factors affecting protected marine mammals in the GOM as a result of cumulative OCS energy-related activities include marine debris, contaminant spills and spill-response activities, vessel traffic, noise, seismic surveys, and explosive structure removals. Non-OCS energy-related activities that may affect marine mammal populations include vessel traffic and related noise (including from commercial shipping, research vessels), military operations, commercial fishing, pollution, scientific research, and natural phenomena. Specific types of impact-producing factors considered in the cumulative analysis include noise from numerous sources, pollution, habitat degradation, vessel strikes, and ingestion and entanglement in marine debris. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on marine mammals can be found in Chapter 4.1.1.11.4 of the 2012-2017 WPA/CPA Multisale EIS.

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-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). The net result of any disturbance will depend upon the size and percentage of the population likely to be affected, the ecological importance of the disturbed area, the environmental and biological parameters that influence an animal's sensitivity to disturbance and stress, or the accommodation time in response to prolonged disturbance (Geraci and St. Aubin, 1980). As discussed in Appendix B of the 2012-2017 WPA/CPA Multisale EIS, a low-probability catastrophic event could have population-level effects on marine mammals.

The effects of the WPA proposed action, when viewed in light of the effects associated with other past, present, and reasonably foreseeable future activities, may result in greater impacts to marine mammals than before the *Deepwater Horizon* explosion, oil spill, and cleanup; however, the magnitude of those effects cannot yet be determined. Nonetheless, operators are required to follow all applicable lease stipulations and regulations, as clarified by NTL's, to minimize these potential interactions and impacts. The operator's reaffirmed compliance with NTL 2012-JOINT-G01 ("Vessel Strike Avoidance and Injured/Dead Protected Species Reporting") and NTL 2012-BSEE-G01 ("Marine Trash and Debris Awareness and Elimination"), as well as the limited scope, timing, and geographic location of the WPA 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. Therefore, no significant cumulative impacts to marine mammals 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.

Within the WPA, 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. Therefore, the incremental effect of the WPA proposed action on marine mammal populations is not expected to be significant when compared with non-OCS energy-related activities.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Various Internet sources were examined to assess recent information regarding this resource that may be pertinent to the WPA. On December 13, 2010, NMFS declared an unusual mortality event (UME) for cetaceans (whales and dolphins) in the Gulf of Mexico. An UME is defined under the Marine Mammal Protect Act as a "stranding that is unexpected, involves a significant die-off of any marine mammal population, and demands immediate response." Evidence of the UME was first noted by NMFS as early

as February 1, 2010, before the *Deepwater Horizon* explosion, oil spill, and cleanup (USDOC, NMFS, 2012a).

On May 9, 2012, NOAA declared an UME for bottlenose dolphins in five Texas counties. The UME lasted from November 2011 through March 2012, when 123 bottlenose dolphins stranded in Aransas, Calhoun, Kleberg, Galveston, and Brazoria Counties in Texas. The investigation is ongoing (USDOC, NMFS, 2012b).

As of August 19, 2012, a total of 764 cetaceans (5% stranded alive and 95% stranded dead) have stranded since the start of the UME, with a vast majority of these strandings between Franklin County, Florida, and the Louisiana/Texas border. The 764 cetaceans include 6 dolphins killed during a fish-related scientific study and 1 dolphin killed incidental to trawl relocation for a dredging project. More detail on the UME can be found on NMFS's website (USDOC, NMFS, 2012a). In addition to investigating all other potential causes, scientists are investigating what role *Brucella* may have played in the UME and this continues today. The total deaths for just one of the cetaceans, the bottlenose dolphin, currently well exceed the Potential Biological Removal (PBR) (Waring et al., 2011). The PBR level is 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.

Relevant data on the status of marine mammal populations after the UME and *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion, 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 have 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 WPA is an active oil and gas region with ongoing (or the potential for) exploration, drilling and production activities. In addition, non-OCS energy-related activities will continue to occur in the WPA irrespective of the WPA 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. Impacts on marine mammals from either smaller accidental events or low-probability catastrophic events will remain the same.

(2) Some marine mammal populations in the WPA 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 cleanup (e.g., coastal bottlenose dolphins that are resident in the WPA). Other marine mammals, such as Bryde's whales and manatees, although potentially affected by the *Deepwater Horizon* explosion, oil spill, and cleanup do not typically occur in the WPA.

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

Summary and Conclusion

BOEM has reexamined the analysis for marine mammals presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. No new significant information was discovered that would alter the impact conclusion for marine mammals presented in the 2012-2017 WPA/CPA Multisale EIS, although information remains incomplete or unavailable. The analysis and

potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.12. Sea Turtles

BOEM has reexamined the analysis for sea turtles presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for sea turtles presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of sea turtles can be found in Chapter 4.1.1.12.1 of the 2012-2017 WPA/CPA Multisale EIS.

Routine activities resulting from the WPA proposed action have the potential to harm sea turtles, although this potential is unlikely to rise to a level of significance. The major impact-producing factors resulting from the routine activities associated with the WPA proposed action that may affect loggerhead, Kemp's ridley, hawksbill, green, and leatherback turtles include the degradation of water quality resulting from operational discharges; noise generated by helicopter and vessel traffic, platforms, drillships, and seismic exploration; vessel collisions; and marine debris generated by service vessels and OCS facilities. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on sea turtles can be found in Chapter 4.1.1.12.2 of the 2012-2017 WPA/CPA Multisale EIS.

Because of the mitigations (e.g., BOEM and BSEE proposed compliance with NTL's) in the 2012-2017 WPA/CPA Multisale EIS, routine activities (e.g., operational discharges, noise, vessel traffic, and marine debris) related to the WPA 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. Lethal effects could occur from chance collisions with OCS service vessels or ingestion of accidentally released plastic materials from OCS vessels and facilities. However, there have been no reports to date on such incidences. Most routine OCS energy-related activities are then expected to have sublethal effects that are not expected to rise to the level of significance.

Accidental, unexpected events associated with the WPA proposed action could negatively impact sea turtles. Such impacts would primarily be the result of blowouts, oil spills, and spill-response activities. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on sea turtles can be found in Chapter 4.1.1.12.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental blowouts, oil spills, and spill-response activities resulting from the WPA 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 area, but they are unlikely to rise to the level of population effects (or significance) given the size and scope of such spills. Further, the potential remains for smaller accidental spills to occur in the WPA 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.

For low-probability catastrophic spills, the 2012-2017 WPA/CPA Multisale EIS concludes that there is a potential for a low-probability catastrophic event to result in significant, population-level effects on affected sea turtle species. BOEM continues to concur with the conclusions from these analyses.

The cumulative analysis considers the effects of impact-producing factors related to the WPA proposed action along with impacts of other commercial, military, recreational, offshore, and coastal activities that may occur and adversely affect populations of sea turtles in the same general area of the WPA proposed action. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on sea turtles can be found in Chapter 4.1.1.12.4 of the 2012-2017 WPA/CPA Multisale EIS.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Various scientific and Internet sources were examined to assess recent information regarding this resource that may be pertinent to the WPA. 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, 2012c). The sea turtle species identified in the strandings include loggerhead, green, Kemp's ridley, leatherback, hawksbill, and unidentified. As of August 19, 2012, NMFS has identified 147 strandings in Alabama, 266 strandings in Louisiana, and 435 strandings in Mississippi. The NMFS has identified 81 strandings in Texas (upper Texas coast—Zone 18).

Over the last 2 years, NOAA has documented necropsy results from many of the stranded turtles indicating mortality due to forced submergence, which is commonly associated with fishery interactions, and acute toxicosis. In June 2011, NMFS announced that it will begin scoping for the preparation of a draft EIS to reduce incidental bycatch and mortality of sea turtles in the southeastern U.S. shrimp fishery (76 FR 37050). On February 8, 2012, NMFS and BOEM finalized an interim ESA process for project-specific consultation procedures that will remain in place until a new biological opinion is completed. These stranding issues, which are constantly updated, are being taken into account in the consultations with NMFS to develop the biological opinion.

Unavailable information on the effects to sea turtles, including from the *Deepwater Horizon* explosion, oil spill, and cleanup (and thus changes to the sea turtle baseline in the affected environment), makes an understanding of the cumulative effects less clear. Here, BOEM concludes that the unavailable information from these events may be relevant to foreseeable significant adverse impacts to sea turtles. Relevant data on the status of sea turtle populations after the *Deepwater Horizon* explosion, oil spill, and cleanup and increased sea turtle GOM strandings may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion 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 based upon 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 two main reasons listed below:

(1) The WPA is an active oil and gas region with ongoing (or the potential for) exploration, drilling, and production activities. In addition, non-OCS energy-related activities will continue to occur in the WPA irrespective of the WPA proposed action (i.e., fishing, military activities, scientific research, and shoreline development). 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. Impacts on sea turtles from either smaller accidental events or low-probability catastrophic events will remain the same.

(2) All wide-ranging populations of sea turtles that may occur in the WPA and within areas affected by the spill are unlikely to have experienced population-level effects from the *Deepwater Horizon* explosion, oil spill, and cleanup given their wide-ranging distribution and behaviors.

Summary and Conclusion

BOEM has reexamined the analysis for sea turtles presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. No new significant information was discovered that would alter the impact conclusion for sea turtles presented in the 2012-2017 WPA/CPA Multisale

EIS, although information remains incomplete or unavailable. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.13. Diamondback Terrapins

BOEM has reexamined the analysis for diamondback terrapins presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for diamondback terrapins presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of Texas diamondback terrapin (*Malaclemys terrapin littoralis*) can be found in Chapter 4.1.1.13.1 of the 2012-2017 WPA/CPA Multisale EIS.

The major impact-producing factors resulting from the routine activities associated with the WPA proposed action that may affect the Texas diamondback terrapin (*Malaclemys terrapin littoralis*) include beach trash and debris generated by service vessels and OCS facilities, efforts undertaken for the removal of marine debris or for beach restoration, and vessel traffic with associated habitat erosion. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on Texas diamondback terrapins can be found in Chapter 4.1.1.13.2 of the 2012-2017 WPA/CPA Multisale EIS.

Adverse impacts due to routine activities resulting from the WPA proposed action are possible but unlikely. Because of the greatly improved handling of waste and trash by industry and because of the annual awareness training required by the marine debris mitigations, the plastics in the ocean are decreasing and the devastating effects on offshore and coastal marine life are minimizing. The routine activities of the WPA proposed action are unlikely to have significant adverse effects on the size and recovery of any terrapin species or population in the GOM. Most routine, OCS energy-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.

The major impact-producing factors resulting from the accidental events associated with the WPA proposed action that may affect Texas diamondback terrapins (*Malaclemys terrapin littoralis*) include offshore and coastal oil spills and spill-response activities. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on Texas diamondback terrapins can be found in Chapter 4.1.1.13.3 of the 2012-2017 WPA/CPA Multisale EIS.

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 WPA 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.

The analyses in the 2012-2017 WPA/CPA Multisale EIS, including Appendix B of the 2012-2017 WPA/CPA Multisale EIS, conclude that there is a low probability for catastrophic spills, and Appendix B of the 2012-2017 WPA/CPA Multisale EIS concludes that there is a potential for a low-probability catastrophic event to result in significant, population-level effects on affected diamondback terrapin species. BOEM continues to concur with the conclusions from these analyses.

The major impact-producing factors that may affect Texas diamondback terrapins (*Malaclemys terrapin littoralis*) include oil spills and spill-response activities, alteration and reduction of habitat, and consumption of trash and debris. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on Texas diamondback terrapins can be found in Chapter 4.1.1.13.4 of the 2012-2017 WPA/CPA Multisale EIS.

Texas diamondback terrapins have experienced impacting pressures from habitat destruction, road construction, drowning in crab traps, and past overharvesting resulting in historical reductions in their habitat range and declines in populations. Inshore oil spills from non-OCS energy-related sources are

potential threats to terrapins in their brackish coastal marshes. Pipelines from offshore oil and gas and other shoreline crossings have contributed to marsh erosion. However, the WPA proposed action includes only limited shoreline crossings and modern regulations require mitigation of wetland impacts. Low-probability catastrophic offshore oil spills could affect the coastal marsh environment but such events are rare occurrences and may not reach the shore, even if they do occur. Therefore, the incremental contribution of the WPA proposed action is expected to be minimal, compared with non-OCS activities. The major impact-producing factors resulting from the cumulative activities associated with the WPA proposed action that may affect the diamondback terrapin include oil spills and spill-response activities, alteration and reduction of habitat, and consumption of trash and debris. 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. No substantial information was found at this time that would alter the overall conclusion that cumulative impacts on diamondback terrapins associated with the WPA proposed action is expected to be minimal.

BOEM has considered this assessment and has reexamined the cumulative analysis for diamondback terrapins. Based on this evaluation, the conclusions in these analyses on effects to diamondback terrapins remain unchanged in regards to routine activities (no potential for significant adverse effects) and accidental spills (potential for significant adverse effects).

Overall, within the WPA, 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. Non-OCS energy-related activities will continue to occur in the WPA irrespective of the WPA proposed action (i.e., crabbing, fishing, military activities, scientific research, and shoreline development). Therefore, the incremental effect of the WPA proposed action on diamondback terrapins 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.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Various Internet sources were examined and literature searches conducted in order to assess recent information regarding diamondback terrapins that may be pertinent to the WPA. No new significant information was discovered that would alter the impact conclusion for Texas diamondback terrapins presented in the 2012-2017 WPA/CPA Multisale EIS.

Unavailable information on the effects to diamondback terrapins from the *Deepwater Horizon* explosion, oil spill, and cleanup (and thus changes to the diamondback terrapin baseline in the affected environment) makes an understanding of the cumulative effects less clear, although current data continue to indicate that the *Macondo* spill never reached terrapins and their brackish habitats in the WPA. As noted in the 2012-2107 WPA/CPA Multisale EIS, BOEM concludes that the unavailable information from these events may be relevant to foreseeable significant adverse impacts to diamondback terrapins, although 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) because diamondback terrapins and their habitats in the WPA were unlikely to have been directly impacted by the *Deepwater Horizon* explosion, oil spill, and cleanup, given that the lateral extent of the spill remained east of the WPA boundary. Relevant data on the status of diamondback terrapin populations in Texas and Louisiana after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion may be difficult or impossible to discern from other factors. Currently, no known studies are being conducted in Texas since the *Macondo* spill never reached brackish habitats in the WPA. 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 subject-matter experts have nonetheless used available scientifically credible evidence in this analysis and based upon accepted scientific methods and approaches. No new information was identified in this Supplemental EIS that would change these conclusions.

Summary and Conclusion

BOEM has reexamined the analysis for Texas diamondback terrapins presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. Various Internet sources

were examined to assess recent information regarding this resource that may be pertinent to the WPA. No new significant information was discovered that would alter the impact conclusion for these terrapins presented in the 2012-2017 WPA/CPA Multisale EIS, although information remains incomplete or unavailable. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.14. Coastal and Marine Birds

BOEM has reexamined the analysis for coastal and marine birds presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for coastal and marine birds presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events that may be associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of coastal and marine birds can be found in Chapter 4.1.1.4.14 of the 2012-2017 WPA/CPA Multisale EIS.

Major potential impact-producing factors 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 helicopter and service-vessel traffic and associated noise (Habib et al., 2007; Bayne et al., 2008);
- mortality due to exposure and intake of OCS-related contaminants, e.g., produced waters (Wiese et al., 2001; Fraser et al., 2006) and discarded debris (Robards et al., 1995);
- 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).

A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on coastal and marine birds can be found in Chapter 4.1.1.14.2 of the 2012-2017 WPA/CPA Multisale EIS.

The majority of the effects resulting from routine activities of the WPA proposed action (**Tables 3-2, 3-4, and 3-5**) on threatened or endangered (**Table 4-1**) and nonthreatened and nonendangered coastal and marine birds are expected to be sublethal, e.g., primarily disturbance-related effects (Chapter 4.1.1.12.1 of the 2012-2017 WPA/CPA Multisale EIS). However, as has been documented by Russell (2005), collision-related mortality of trans-Gulf migrant landbirds does occur (**Figure 4-1** of this Supplemental EIS and Figures 3-5 through 3-7 of the 2012-2017 WPA/CPA Multisale EIS); approximately 50 birds/platform or roughly 200,000 birds/year across the archipelago (~4,000 platforms). Therefore, mortality estimates for migrant birds from collisions with platforms over a 40-year period (estimated lifespan of a platform) may be on the order of approximately 8-13 million birds (Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS). The collision death estimates should also be considered biased low given that (1) the platform-specific estimates associated with number of anticipated installed platforms only include deaths due to collisions and (2) these estimates and the long-term estimates do not account for issues related to detection bias (Piatt et al., 1990a; Piatt and Ford, 1996; Flint et al., 1999) or lost bird years (Zafonte and Hampton, 2005). Taking this bias into account, BOEM has determined that these collision mortality estimates still represent an adverse, but not significant, impact to migrant birds. This is because it has been estimated from theoretical analyses of 1998 and 1999 radar data that there could be 147 (1999) to 316 (1998) million trans-Gulf migrants in the spring season for a given year (Russell,

2005). Although there will always be some level of incomplete information on the effects from routine activities under the WPA proposed action on birds, there is credible scientific information, applied using acceptable scientific methodologies, to support the conclusion that any realized impacts would be generally sublethal in nature and not in themselves rise to the level of reasonably foreseeable significant adverse (population-level) effects. Also, routine activities will be ongoing in the WPA proposed action area as a result of existing leases and related activities.

Within the WPA, there is a long-standing and well-developed OCS Program (more than 50 years); there are no data to suggest that routine activities from the preexisting OCS Program are significantly impacting coastal and marine bird populations. Therefore, a full understanding of any incomplete or unavailable information on the effects of routine activities is not essential to make a reasoned choice among the alternatives. Particularly when compared with other causes of bird mortality, the routine events associated with the OCS Program are unlikely to result in population-level impacts to avian species.

Overall, impacts to avian species from routine activities are expected to be adverse but not significant. The impacts include the following:

- temporary behavioral changes, temporary or permanent changes in habitat use, temporary changes in foraging behavior, temporary changes to preferred foods or prey switching, temporary or permanent emigration, temporary or permanent reductions in nesting, hatching, and fledging success;
- sublethal, chronic effects due to exposure to or intake of OCS-related contaminants via spilled oil, pollutants in the water from service vessels, produced water, or discarded debris;
- nocturnal circulation around platforms may create acute sublethal stress from energy loss and the addition of platforms will increase collision risk;
- minimal habitat impacts (based on actual acres of footprint) are expected (onshore or within State waters) to occur directly from routine activities resulting from the WPA proposed action (but refer to Johnston et al., 2009); and
- secondary impacts from pipeline and navigation canals to coastal habitats will occur over the long term and may ultimately displace species to other habitats, if available.

Presently, there are no mitigations (or stipulations) in place specific for the protection and conservation of migratory birds in the Gulf (USDOI, FWS and USDOI, MMS, 2009; Alexander, 2010). However, avoidance measures and conditions are routinely placed on permitted activities to protect habitat (Table 4-3 of the 2012-2017 WPA/CPA Multisale EIS; but also refer to Johnston et al., 2009; Bayne and Dale, 2011; Johnson and St-Laurent, 2011).

The major impact-producing factors resulting from the accidental events associated with the WPA proposed action that may affect the coastal and marine birds include oil spills regardless of size and oil-spill cleanup activities, including the release of rehabilitated birds. A detailed impact analysis of the accidental events that may be associated with proposed WPA Lease Sale 233 on coastal and marine birds can be found in Chapter 4.1.1.14.2 of the 2012-2017 WPA/CPA Multisale EIS.

Overall, impacts to coastal and marine birds associated with accidental events (oil spills regardless of size) in the WPA should be less than in the CPA due to the following factors: fewer platforms; lower oil-spill probabilities; and much lower numbers of predicted oil spills, particularly pipeline spills over the life of the WPA proposed action (**Tables 3-2, 3-4, and 3-5** of this Supplemental EIS and Tables 3-12 and 3-21 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. 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., 2000a; Alonso-Alvarez et al., 2007a), including changes to sexual signaling (Pérez et al., 2010).

Oil-spill impacts on birds from the WPA 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 WPA proposed action (Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS). Impacts of oil-spill cleanup from the WPA proposed action are also expected to be adverse, but not significant, but 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 catastrophic spill, depending on the timing, location, and size of the spill. For additional information on a catastrophic spill, refer to Appendix B of the 2012-2017 WPA/CPA Multisale EIS.

Cumulative impacts to coastal and marine birds include both OCS and non-OCS activities. The OCS activities include the following:

- the WPA proposed action; and
- prior and future OCS sales.

The non-OCS activities include the following:

- State oil and gas activity;
- crude oil imports by tankers; and
- other commercial, military, and recreational offshore and coastal activities.

The OCS-related, impact-producing factors include the following:

- air pollution;
- pollution of coastal and offshore waters resulting from OCS-related activities including platform and pipeline oil spills, produced waters, and any spill-response activities;
- structure presence and lighting;
- aircraft and vessel traffic and associated noise and disturbance impacts, including OCS helicopter and service-vessels;
- habitat loss, alteration, and fragmentation resulting from coastal facility construction and development;
- OCS pipeline landfalls; and
- trash and debris.

The non-OCS, impact-producing factors include the following:

- air pollution;
- pollution of coastal waters resulting from municipal, industrial, and agricultural runoff and discharge;
- tanker oil spills and spills related to oil and gas activities in State coastal waters and any spill-response activities;
- aircraft and military activities, including jet training overflights and sonic booms;
- nonconsumptive recreation, including bird-watching activities, all-terrain vehicle use, walking and jogging with pets, and other beach use;
- maintenance and use of navigation waterways;

- habitat loss, alteration, and fragmentation associated with commercial and residential development;
- collisions of coastal and marine birds with various anthropogenic structures (e.g., buildings, power lines, cell phone towers, etc.);
- diseases;
- climate change and related impacts;
- storms and floods;
- coastal development; and
- fisheries interactions.

A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on coastal and marine birds can be found in Chapter 4.1.1.14.4 of the 2012-2017 WPA/CPA Multisale EIS.

Human-induced disturbance effects often tend to get overlooked or underestimated as a potential population-limiting factor for birds (Hockin et al., 1992; Newton, 1998, pages 365-369). The cumulative effect on coastal and marine birds from all sources is expected to result in changes in species composition and distribution, and a discernible (i.e., low thousands; Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS) decline in the number of birds that form localized groups or populations. Some of these changes are expected to be permanent and to stem from a net decrease in preferred habitat for all birds, and possibly impacts to and declines in the amount or quality of critical habitat for some endangered species (**Table 4-1** of this Supplemental EIS; also refer to Table 4-14 of the 2012-2017 WPA/CPA Multisale EIS). However, the incremental contribution of the WPA proposed action to the cumulative impact is considered adverse but not significant because the effects of the most probable impacts, such as 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 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.

Nocturnal circulation events at platforms are assumed to have mostly sublethal impacts (e.g., energetic losses due to time spent circling) on migrating bird populations. However, oil and gas platforms in the GOM (and associated lighting) result in collision-related mortality of 200,000-321,000 birds/year (Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS); these numbers will increase as a result of the WPA proposed action. Similarly, some unknown number of birds that stopover on platforms is preyed upon by migrating raptors (Russell, 2005). Overall, offshore oil and gas platform-related avian mortality, though representing an additional source of human-induced mortality, represents a small fraction compared with other sources of human-induced mortality. The mortality estimates related to offshore oil and gas activities are well below that for vehicles, buildings and windows, power lines, and communication towers (Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS).

The *Deepwater Horizon* explosion and oil spill, which made it into the nearshore and coastal environment, resulted in the loss of ~7,250 birds across all Gulf of Mexico planning areas (**Table 4-2** of this Supplemental EIS; also refer to Table 4-8 of the 2012-2017 WPA/CPA Multisale EIS). A small but unknown fraction of the total dead and live birds was collected in the WPA (USDOI, FWS, 2010a and 2010b). It is likely that birds were not oiled in the WPA, but additional information from the SCAT data and more detailed geospatial information for each bird recovered and its oiling state (oiled vs. unoiled) would be required to state that conclusively. In addition, spill-response activities likely exacerbated impacts, particularly for breeding birds nesting on the beaches, barrier islands, and other habitats that were intensively monitored. It is probable that impacts to the avian community in the WPA were far less than impacts to the avian community in the CPA. The total number of birds killed by the *Deepwater Horizon* explosion, oil spill, and cleanup was likely biased low. In addition, it will be years before a

reliable, model-based estimate of mortality that accounts for detection-related issues is provided (e.g., Flint et al., 1999; also refer to Byrd et al., 2009).

Presently, the best available information (e.g., Henkel et al., 2012) does not provide a complete understanding of the effects of the spilled oil or the recovery potential for the most impacted species (**Table 4-2** of this Supplemental EIS; also refer to Tables 4-8, 4-12, and 4-13 of the 2012-2017 WPA/CPA Multisale EIS). Unavailable information on the effects to birds, including from the *Deepwater Horizon* explosion, oil spill, and cleanup (and thus changes to the birds baseline in the affected environment), makes an understanding of the cumulative effects less clear, although most species in the WPA were likely unaffected based on the lateral extent of the plume, residency periods, and migration patterns. Here, BOEM concludes that the unavailable information from this event may be relevant to foreseeable significant adverse impacts to birds. Relevant data on the status of coastal and marine bird populations after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion 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 based upon 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 (including the No Action and Action alternatives) for the following reasons.

The WPA is an active oil and gas region with ongoing (or the potential for) exploration, drilling, and production activities. In addition, non-OCS energy-related activities will continue to occur in the WPA irrespective of the WPA 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. Impacts on birds from either smaller accidental events or low-probability catastrophic events will remain the same. The oil plume from the *Deepwater Horizon* explosion and oil spill remained east of the WPA boundary, and impacts to birds in the WPA were likely negligible (Figure 4-15 of the 2012-2017 WPA/CPA Multisale EIS).

Disease is often lethal and may take millions of birds annually, but it should be considered a "naturally" occurring avian mortality factor unless the pathogen is introduced by humans (refer to Newton, 1998). Storms and floods represent natural, often major disturbances to which exposed organisms are generally adapted. An exception would be hurricane-related storm surges, which are exacerbated by coastal wetland loss in Louisiana and throughout the northern GOM (Costanza et al., 2008; Engle, 2011). Effects from sea-level rise may be particularly severe for many species of breeding marsh- and shorebirds (e.g., brown pelican, sandwich tern, black skimmer, Forster's tern, laughing gull, gull-billed tern, royal tern, snowy plover, least tern, and Wilson's plover; USDOI, FWS, 2010c), as well as several species of wintering shorebirds that rely on beaches, flats, dunes, sandbars, shorelines, islands, estuaries, and other low-lying, tidally influenced habitats in the Gulf of Mexico (Galbraith et al., 2002; North American Bird Conservation Initiative, 2010). Even a nominal rise in sea level (USDOC, NOAA, 2011a, pages 36-37) would inundate much of this habitat, making it unsuitable for many, if not most, of these species.

In conclusion, the incremental contribution of the WPA proposed action to the cumulative impact is considered adverse but not significant when compared with the impacts of non-OCS Program-related factors.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

For the WPA, only Bird Conservation Region (BCR) 37 was considered, as the other two BCR's (27 and 31) encompass areas outside the WPA. Bird Conservation Region 37 includes 44 Birds of Conservation Concern, of which 30 (68.2%) are considered as having a potential to be impacted by offshore oil and gas development, with 20 (45.4%) representing species with a high probability of oiling in the event of a spill (Table 4-11 of the 2012-2017 WPA/CPA Multisale EIS**)**. National Wildlife Refuges with a marine component are located in Louisiana (n = 7; 250,070 ac [101,200 ha]) and Texas

(n = 10; 493,968 ac [199,902 ha]) and are managed primarily for the protection and conservation of migratory birds (Figure 4-12 of the 2012-2017 WPA/CPA Multisale EIS).

A detailed treatment of the potential effects of impact-producing factors on coastal and marine birds associated with the WPA proposed action can be found in Chapter 4.1.1.14.2 of the 2012-2017 WPA/CPA Multisale EIS. A list of potentially impacted avian species considered herein can be found in **Table 4-2** of this Supplemental EIS and in Chapter 4.1.1.14.1 and Tables 4-9 through 4-11 of the 2012-2017 WPA/CPA Multisale EIS. The new information with regards to bird data are found in **Tables 4-1 and 4-2**. **Table 4-1** was updated with more recent data from FWS. The data and estimates reported in **Table 4-2** are corrected from Table 4-8 of the 2012-2017 WPA/CPA Multisale EIS. These were corrected with regards to an update for the dead birds collected from FWS. The end date for dead birds collected is now May 2011.

The majority of the effects resulting from routine activities of the WPA proposed action (**Tables 3-2, 3-4, and 3-5** of this Supplemental EIS and Tables 3-13 through 3-16 of the 2012-2017 WPA/CPA Multisale EIS) on threatened or endangered (**Table 4-1**) and nonthreatened and nonendangered coastal and marine birds are expected to be sublethal, e.g., primarily disturbance-related effects (Chapters 4.1.1.14.1 and 4.1.1.14.2 of the 2012-2017 WPA/CPA Multisale EIS).

Although there will always be some level of incomplete information on the effects from routine activities under the WPA proposed action on birds, there is credible scientific information, applied using acceptable scientific methodologies, to support the conclusion that any realized impacts would be generally sublethal in nature and not in themselves rise to the level of reasonably foreseeable significant adverse (population-level) effects. Also, routine activities will be ongoing in the WPA proposed action area as a result of existing leases and related activities. Within the WPA, there is a long-standing and well-developed OCS Program (more than 50 years). Therefore, a full understanding of any incomplete or unavailable information on the effects of routine activities is not essential to make a reasoned choice among the alternatives for the reasons described herein and in the 2012-2017 WPA/CPA Multisale EIS. Particularly when compared with other causes of bird mortality, the routine events associated with the OCS Program are unlikely to result in population-level impacts to avian species.

Overall, impacts to avian species from routine activities are expected to be adverse, but not significant. The impacts include the following:

- temporary behavioral changes, temporary or permanent changes in habitat use, temporary changes in foraging behavior, temporary changes to preferred foods or prey switching, temporary or permanent emigration, temporary or permanent reductions in nesting, hatching, and fledging success;
- sublethal, chronic effects due to exposure to or intake of OCS-related contaminants via spilled oil (**Table 4-2**), pollutants in the water from service vessels, produced water, or discarded debris;
- nocturnal circulation around platforms, which may create acute sublethal stress from energy loss (and the addition of platforms will increase collision risk);
- minimal habitat impacts (based on actual acres of footprint), which are expected (onshore or within State waters) to occur directly from routine activities resulting from the WPA proposed action (but refer to Johnston et al., 2009); and
- secondary impacts from pipeline and navigation canals to coastal habitats, which will occur over the long term and may ultimately displace species to other habitats, assuming comparable (quality) habitats are available.

Presently, there are no mitigations (or stipulations) in place specific for the protection and conservation of migratory birds in the Gulf (USDOI, FWS and USDOI, MMS, 2009; Alexander, 2010). However, avoidance measures and conditions are routinely placed on permitted activities to protect habitat (but refer to Fox et al., 2006; Bayne and Dale, 2011; Johnson and St-Laurent, 2011).

Unavailable information on the effects to birds, including from the *Deepwater Horizon* explosion, oil spill, and cleanup (and thus changes to the birds baseline in the affected environment), makes an understanding of the cumulative effects less clear; most species in the WPA were likely unaffected based

on the lateral extent of the plume, residency periods, and migration patterns. BOEM concludes that the unavailable information from this event may be relevant to foreseeable significant adverse impacts to birds. Relevant data on the status of coastal and marine bird populations after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion 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 based upon 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 (including the No Action and an Action alternative) because the missing information is not thought to be critical.

Summary and Conclusion

BOEM has reexamined the analysis for coastal and marine birds presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. At the present time, there is no way to discern if the additional levels of annual (>200,000) or long-term mortality (over the life of newly installed platforms) for any of the affected trans-Gulf migrant species considered herein results in population-level impacts (Russell 2005, Chapters 17 and 18). Given what we know about the life-history characteristics of many of these species (e.g., age at first reproduction, clutch size, nest success, etc.), the potential for major population-level impacts seems relatively low (Arnold and Zink, 2011, page 2). No new significant information was discovered that would alter the impact conclusion for coastal and marine birds presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.15. Fish Resources and Essential Fish Habitat

BOEM has reexamined the analysis for fish resources and essential fish habitat (EFH) presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of fish resources and EFH can be found in Chapter 4.1.1.15 and Appendix D of the 2012-2017 WPA/CPA Multisale EIS. Also, EFH are discussed in various chapters of this document, including water quality (**Chapters 4.1.1.2 and 4.2.1.2**), wetlands (**Chapters 4.1.1.4 and 4.2.1.4**), seagrass communities (**Chapters 4.1.1.5 and 4.2.1.5**), live bottoms (**Chapter 4.2.1.6**), topographic features (**Chapters 4.1.1.6 and 4.2.1.7**), *Sargassum* communities (**Chapters 4.1.1.7 and 4.2.1.8**), chemosynthetic deepwater benthic communities (**Chapters 4.1.1.8 and 4.2.1.9**), nonchemosynthetic deepwater benthic communities (**Chapters 4.1.1.9 and 4.2.1.10**), and soft bottom benthic communities (**Chapters 4.1.1.10 and 4.2.1.11**).

Effects on fish resources and EFH from routine activities associated with the WPA proposed action could result from coastal environmental degradation, marine environmental degradation, pipeline trenching, and offshore discharges of drilling muds and produced waters. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on fish resources and EFH can be found in Chapter 4.1.1.15.2 of the 2012-2017 WPA/CPA Multisale EIS.

Without the mitigations in place, there could be negative impacts to fish resources and EFH. However, because of the mitigations, the WPA proposed action is expected to result in a minimal decrease in fish resources and/or standing stocks or in EFH. It would require a short time for fish resources to recover from most of the routine activities because impacts to the habitat would generally be temporary. Also, fish tend to avoid areas of impact (thus reducing mortality effects) and most fish species are prolific reproducers. Recovery from the loss of wetlands habitat would probably not occur,

but it would likely result in conversion of the lost wetland habitats into open water or mudflats, which may qualify as other forms of EFH.

It is expected that any possible coastal and marine environmental degradation from routine activities associated with the WPA proposed action would have little effect on fish resources or EFH. The impact of coastal and marine environmental degradation is expected to cause a nondetectable decrease in fish resources or in EFH. Routine activities such as pipeline trenching and OCS discharge of drilling muds and produced water would cause negligible impacts that would not deleteriously affect fish resources or EFH. This is because of regulations, mitigations, and practices that reduce the undesirable effects on coastal habitats from dredging and other construction activities. Permit requirements should ensure that pipeline routes either avoid different coastal habitat types or that certain techniques are used to decrease impacts. At the expected level of impact, the resultant influence on fish resources would cause minimal changes in fish populations or EFH. That is, if there are impacts, they would be short term and localized; therefore, they would only affect small portions of fish populations and selected areas of EFH. As a result, there would be little disturbance to fish resources or EFH. In deepwater areas, many of the EFH's are protected under stipulations and regulations currently set in place.

Additional hard-substrate habitat provided by structure installation in areas where natural hard bottom is rare would tend to increase fish populations. The removal of these structures would eliminate that habitat, except when decommissioned platforms are used as artificial reef material. This practice is expected to increase over time.

Accidental events associated with the WPA proposed action that could impact fish resources and EFH include blowouts and oil or chemical spills. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on fish resources and EFH can be found in Chapter 4.1.1.15.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events that could impact fish resources and EFH include blowouts and oil or chemical spills. Because subsurface blowouts, although a highly unlikely occurrence, suspend large amounts of sediment, they have the potential to adversely affect fish resources in the immediate area of the blowout.

If oil spills due to the WPA 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, to metabolize hydrocarbons, and to excrete both metabolites and parent compounds. Fish and shellfish eggs and larvae would be unable to avoid spills, and early development stages may be at greater risk. Fish populations may be impacted by an oil spill, but they will be primarily affected if the oil reaches the shelf and estuarine areas because these are the most productive areas and 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. The extent of the impacts of the oil would depend on the properties of the oil and the time of year of the event. Also, much of the coastal areas of the northern GOM are moderate- to high-energy environment; therefore, sediment transport and tidal stirring should reduce the chances for oil persisting in these habitats if they are oiled. 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 (Carls et al., 1999; Whitehead et al., 2011). Oil can be lethal to fish, especially in larval and egg stages, depending on the time of the year that the event happened. The extent of the impacts of the oil would depend on the properties of the oil and the time of year of the event.

The effect of oil spills that may be associated with the WPA proposed action on fish resources is expected to cause a minimal decrease in standing stocks of any population because the most common spill events would be small in scale and localized; therefore, they would affect generally only a small portion of fish populations. Historically, there have been no oil spills of any size in the GOM that have had a long-term impact on fishery populations. Although many potential effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on fish populations of the GOM have been alleged, the actual effects are at this time unknown and the total impacts are likely to be unknown for several years.

BOEM has determined that it cannot obtain this information, regardless of cost, within the timeframe contemplated by this NEPA analysis, and it may be years before the information is available. In the meantime, where this incomplete information is relevant to reasonably foreseeable impacts, it was determined if it was essential to a reasoned choice among alternatives and if not, scientifically credible information that is available was used in its stead and applied using accepted methodology.

Although there is incomplete or unavailable information on the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup on fish resources and EFH, BOEM has determined that it is impossible

for this Agency to obtain this information, regardless of cost, within the timeframe contemplated by this NEPA analysis, and it may be years before the information is available. This information is being developed through the NRDA process, data is still incoming and has not been made publicly available, and it is expected to be years before the information is available. In addition, where this incomplete information is relevant to reasonably foreseeable impacts, what scientifically credible information is available was used in its stead and applied using accepted scientific methodologies. Nevertheless, BOEM believes that this information is not essential to a reasoned choice among alternatives. The likely size of an accidental event resulting from the WPA proposed action would be small and unlikely to impact coastal and estuarine habitats where juvenile and larval stages of fish resources are predominant, and adult fish tend to avoid adverse water conditions.

The cumulative analysis includes effects on fish resources and EFH's of the OCS Program (the WPA proposed action and past and future OCS lease sales), State oil and gas activity, coastal development, crude oil imports by tanker, commercial and recreational fishing, and natural phenomena. An example of impact-producing factors considered in this cumulative analysis include cumulative onshore impacts on EFH's, such as wetland loss as a result of human population expansion, environmental degradation, relative sea-level rise, and natural factors (e.g., hurricane loss of wetlands). A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on fish resources and EFH can be found in Chapter 4.1.1.15.4 of the 2012-2017 WPA/CPA Multisale EIS.

There are widespread anthropogenic and natural factors that impact EFH and fish populations in the GOM. These include OCS and non-OCS related factors. Different OCS-related construction can range from onshore facilities to well-site construction activities, including board roads, ring levees, and impoundments. With the number of pipelines estimated for the WPA proposed action, sediment would potentially be resuspended in the localized areas. The explosive removal of structures does have a negative effect on those fish in close proximity. The OCS activities such as the emplacement of structures and of artificial reefs also have a positive effect by providing habitat and/or food for reef fishes, but their removals can be detrimental. Discharges from OCS activities, such as drill mud and produced water, have an incremental effect on offshore water quality. All discharges are regulated by USEPA or State agencies. Oil spills, although considered rare events, can affect waters. Fish are known to avoid any area of adverse water quality (Wannamaker and Rice, 2000), so they would be less likely to remain in the immediate vicinity of a spill. The OCS-related activities that could physically destroy live bottoms (e.g., anchoring and using anchor chains) are mitigated by BOEM. The OCS factors potentially impacting fish resources in the Gulf of Mexico are federally regulated or mitigated and are small. There are many anthropogenic factors that are regulated by Federal and State agencies, and there are natural factors that cannot be regulated. Also to be considered is the variability in GOM fish populations due to natural factors such as spawning success and juvenile survival. Overall, the incremental contribution of OCS effects to finfish populations is small.

Inshore inputs of pollutants to estuaries from runoff and industry are also contributors to wetland loss. Canal dredging primarily accommodates commercial, residential, and recreational development. Increased population and commercial pressures on the WPA coast are also causing the expansion of ports and marinas there. The coastal waters of Texas are expected to continue to experience nutrient enrichment, low-dissolved oxygen, and toxin and pesticide contamination, resulting in the loss of both commercial and recreational uses of the affected waters. The degradation of water quality is expected to continue due to contamination by point- and nonpoint-source discharges due to eutrophication of waterbodies, primarily due to runoff and hydrologic modifications. Resource management agencies, both State and Federal, set restrictions and permits in an effort to mitigate both 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 long-term feasibility of these coastal restoration efforts.

Overfishing (including bycatch) has contributed in a large way to some populations of GOM fish. 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. Limits on catch and fishing seasons are set by the Gulf of Mexico Fisheries Management Council. State agencies regulate inshore fishing seasons and limits.

Naturally occurring tropical cyclones can cause damage to various EFH's. These can be onshore as with wetland loss and offshore as with damaged topographic features. These storms are a continual part of the Gulf of Mexico climate.

All of these events and activities cause some sort of effect on the different EFH's and fish resources. Many anthropogenic inputs, including the WPA proposed action, are now monitored, regulated, and mitigated by the permitting agency or State. These efforts will continue in the future, and the restoration of habitats could increase with better technologies. While EFH and fish resources are impacted by these many factors, the WPA proposed action would add a minimal amount to the overall cumulative effects.

As noted in Chapter 4.1.1.15.1 of the 2012-2017 WPA/CPA Multisale EIS, most of the Gulf of Mexico is designated as EFH and encompasses many different types of habitats and resources, which are described in this Supplemental EIS. The extent of impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup to EFH and fish resources remains unclear at this time. This information is being developed through the NRDA process, data is still incoming and has not been made publicly available, and it is expected to be years before the information is available. No evidence of significant impacts to fisheries populations in the Gulf of Mexico have been shown to date.

In addition, where this incomplete information is relevant to reasonably foreseeable impacts, what scientifically credible information is available was used in its stead and applied using accepted scientific methodologies in this section and in the 2012-2017 WPA/CPA Multisale EIS. Although it may be relevant to reasonably foreseeable adverse impacts, this incomplete or unavailable information is not essential to a reasoned choice among alternatives. Compared with other impacting factors on EFH and fish resources, including those related to coastal and marine degradation, wetland loss, vessel traffic, and coastal development, the WPA proposed action is not likely to result in an incremental increase in impacts to EFH and fish resources, regardless of any lingering impacts from *Deepwater Horizon* explosion, oil spill, and cleanup.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

An ongoing search of Internet information sources as well as an ongoing search of scientific journals was conducted to determine the availability of recent information (including Science Direct, Elsevier, CSA Illumina, and JSTOR). No new significant scientific information has been identified as relevant to this analysis since publication of the 2012-2017 WPA/CPA Multisale EIS.

Although there is incomplete or unavailable information on the impacts of *Deepwater Horizon* explosion, oil spill, and cleanup on fish resources and EFH, BOEM has determined that it is impossible for this Agency to obtain this information, regardless of cost, within the timeframe contemplated by this NEPA analysis, and it may be years before the information is available. This information is being developed through the NRDA process, data is still incoming and has not been made publicly available, and it is expected to be years before the information is available. In addition, where this incomplete information is relevant to reasonably foreseeable impacts, what scientifically credible information is available was used in its stead and applied using accepted scientific methodologies. Nevertheless, BOEM believes that this information is not essential to a reasoned choice among alternatives as discussed in this section and in the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

BOEM has reexamined the analysis for fish resources and EFH presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. No new significant information was discovered that would alter the impact conclusion for fish resources and EFH presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.16. Commercial Fisheries

BOEM has reexamined the analysis for commercial fisheries presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for commercial fisheries presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events that may be associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information

is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of commercial fisheries can be found in Chapter 4.1.1.16.1 of the 2012-2017 WPA/CPA Multisale EIS.

Healthy fishery stocks depend on EFH waters and substrate necessary to fish for spawning, breeding, feeding, and growing to maturity. Since the majority of the commercial species harvested within the WPA are estuary dependent, coastal environmental degradation resulting from the WPA proposed action, although indirect, has the potential to adversely affect EFH and commercial fisheries. Wetlands and estuaries in the WPA may be affected by activities resulting from the WPA proposed action. These activities include construction of new onshore facilities in wetland areas, pipeline emplacement in wetland areas, vessel usage of navigation channel and access canals, maintenance of navigation channels, inshore disposal of OCS-generated petroleum field wastes, and spills from both coastal and offshore OCS-support activities. Most of the wetlands loss in the WPA, however, is a result of OCS activities associated with residential and industrial development in wetlands. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on commercial fisheries can be found in Chapter 4.1.1.16.2 of the 2012-2017 WPA/CPA Multisale EIS.

Some of the impact-causing actions to commercial fish habitat are mitigated by BOEM through the Topographic Features Stipulation that is applied to each lease sale that establishes a No Activity Zone around important topographic features, such as the Flower Garden Banks. Also, NTL 2009-G39 advises operators to avoid hard-bottom habitats that support fish populations, and USEPA's discharge permit system mitigates potential impacts from produced water.

Estuarine water quality degradation is largely a result of urban runoff. Offshore water quality is affected temporarily and is in a limited area by the produced-water discharge and the overboard discharge of drilling muds. Pipeline trenching, maintenance dredging, and canal widening in inshore areas would cause only temporary suspension of sediments. Negative impacts from most of these routine operations would require a short time for fish resources to recover. Recovery from the loss of wetlands habitat would probably not occur.

Space-use conflicts will continue in the offshore area, although the area off limits to fishing (especially longlining) is small. Some gear loss will continue to occur as will down time from seismic surveys. The Fishermen's Compensation Fund compensates U.S. commercial fishermen and other eligible citizens and entities for property and economic loss caused by obstructions related to oil and gas development activities on the OCS. The NMFS administers and processes Fishermen's Contingency Fund claims, and BOEM coordinates communications with OCS leaseholders and maintains the database for reported obstructions. The level of impact of the WPA proposed action on the commercial fisheries in the WPA is expected to be small.

Additional hard-substrate habitat provided by structure installation in areas where natural hard bottom is rare will tend to increase 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.

Negative impacts from most of these routine operations would require a short time for fish resources to recover. Recovery from the loss of wetlands habitat would probably not occur. For these reasons, as well as the fact that Gulf of Mexico fish stocks have retained both diversity and biomass throughout the years of offshore development, the WPA proposed action is expected to result in a minimal decrease in fish resources.

Accidental events that could impact commercial fisheries include subsurface offshore blowouts and oil spills, both inshore and offshore. There is a small risk of spills occurring during shore-based support activities. The great majority of these shore-based spills would be very small, limited to the storage capacity, and would require shorter response time. Most of these incidents would occur at or near pipeline terminals or shore bases, and they are expected to affect a highly localized area with low-level impacts. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on commercial fisheries can be found in Chapter 4.1.1.4.16.3 of the 2012-2017 WPA/CPA Multisale EIS.

BOEM has examined the available data for impacts of the WPA proposed action to commercial fisheries in the WPA. Accidental events that could impact commercial fisheries include blowouts and oil or chemical spills. Because subsurface blowouts, although a highly unlikely occurrence, suspend large

amounts of sediment, they have the potential to adversely affect fisheries resources in the immediate area of the blowout.

Oil spills on the OCS due to the WPA proposed action are highly unlikely. If oil spills due to the WPA 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 a spill. This behavioral mechanism allows them to move away from the source of the hydrocarbons, therefore minimizing the likelihood of fish kills.

The most damaging oil spills to commercial fisheries populations would be those reaching the productive shelf or estuaries. Negative impacts would be greatest on those populations that are short lived and harvested annually, such as crabs and shrimp, or those populations that are sessile, such as oysters. Spills of this magnitude from the Exclusive Economic Zone have, however, a very low probability of occurrence historically.

Most closures from oil spills are small and short lived. Fishermen are generally able to avoid the area, causing only localized economic impacts. Large-scale closures are rare but can temporarily inflict a negative impact on commercial fishermen and the sale of local fish products. Closures may also relieve fishing pressure and allow fisheries populations to increase the following year.

The potential impacts of the WPA proposed action from accidental events (i.e., a well blowout or an oil spill) are anticipated to be minimal because the potential for oil spills is very low, the most typical events are small and of short duration, and the effects are so localized that fish are typically able to avoid the area adversely impacted.

The cumulative analysis considers activities that have occurred, are currently occurring, and could occur and adversely affect commercial fisheries for the years 2012-2051. These activities include the effects of the OCS Program (proposed action and prior and future OCS sales), State oil and gas activity, the status of commercial fishery stocks, oil transport by tankers, natural phenomena, and commercial and recreational fishing.

Specific types of impact-producing factors considered in the cumulative analysis include the following: (1) commercial fishing techniques or practices; (2) hurricanes; (3) installation of production platforms and underwater OCS obstructions; (4) production platform removals; (5) seismic surveys; (6) petroleum spills; (7) subsurface blowouts; (8) pipeline trenching; and (9) offshore discharges of drilling mud and produced waters. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on commercial fisheries can be found in Chapter 4.1.1.16.4 of the 2012-2017 WPA/CPA Multisale EIS.

Activities resulting from the OCS Program and non-OCS events have the potential to cause limited detrimental effects to commercial fisheries, landings, and the value of those landings. The impact-producing factors of the cumulative scenario that are expected to substantially affect commercial fisheries include commercial and fishing techniques or practices (overfishing), hurricanes, installation of production platforms and underwater OCS obstructions, production platform removals, seismic surveys, petroleum spills, subsurface blowouts, pipeline trenching, and offshore discharges of drilling mud and produced waters.

Because the area of the installation of production platforms is small as compared with the area available in the WPA for fishing and because the impacts from platform removals are so localized, the cumulative impact of these activities with the WPA proposed action to the commercial fisheries is anticipated to be minor. The effects of seismic surveys have been determined to be limited in time and space. The effects of seismic surveys are, therefore, expected to be minimal overall.

Subsurface blowouts, such as the *Deepwater Horizon* explosion and oil spill, that include both oil and natural gas have the potential to affect fish populations, particularly eggs and larvae. The full effects of this type of spill on individual fisheries in the Gulf of Mexico are currently unknown, but spills of this type are a low-probability event. The potential impacts are discussed in Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Because spills of this magnitude are low-probability events, their contribution to the cumulative impact on commercial fisheries populations is not expected to be large as a result of the WPA proposed action. Also, fish are known to actively avoid areas of oil spills as they avoid any area of adverse water quality.

The OCS factors can physically destroy live bottoms with anchors and anchor chains. These actions are mitigated by BOEM. The explosive removal of structures does have a negative effect on those fish in close proximity to the explosion at the time of removal. The OCS activities such as the emplacement of structures and artificial reefs also have a positive effect by providing habitat and/or food for reef fishes.

Significant contributions to cumulative impacts from oil and gas activities are not anticipated as a result of pipeline trenching because sandy sediments are quickly redeposited within 400 m (1,312 ft) of a trench, and finer sediments are widely dispersed and redeposited over a period of hours to days within a few thousand meters of the event. These are small areas as compared with the rest of the Gulf of Mexico, and they are temporary disturbances.

Offshore discharges of drilling mud have been shown to dilute to near background levels within 1,000 m (3,281 ft) of the discharge point. Because offshore discharges of produced water disperse and dilute to near background levels within 1,000 m (3,281 ft) of the discharge point and because of mercury in sediments near drilling platforms is not in a bioavailable form, the contribution of produced-water discharges to the cumulative impacts of the WPA proposed action is not anticipated to be significant.

Wetland loss as a result commercial and residential development is one of the major factors in this trend, although this is regulated and mitigated by COE. The loss of marsh and seagrass habitats that provides shelter for larvae and juveniles of many species is a major problem, particularly in the WPA. The loss of wetlands also contributes to the intrusion of saltwater into oyster-producing waters. This increases oyster mortality by increasing disease and predators in the oyster beds.

The OCS activities that may affect fish populations include a small contribution to wetland loss as a result of offshore traffic traversing inland canals. There is also a contribution of pollution from oil-related activities to inland waters and estuaries. Discharges from OCS activities such as drill mud and produced water have an incremental effect on offshore water quality. All discharges are regulated by USEPA or State agencies.

Inshore inputs of pollutants to estuaries from runoff and industry are also contributors to wetland loss. Resource management agencies, both State and Federal, set restrictions and 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 long-term feasibility of these coastal restoration efforts.

Overfishing (including bycatch) has contributed in a large way to the decline of some populations of Gulf of Mexico of commercial fish species. 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. The limits on catch and fishing seasons are set by the Gulf Coast Fisheries Management Council. State agencies regulate inshore fishing seasons and limits. The OCS factors potentially impacting fish resources in the Gulf of Mexico are federally regulated or mitigated and are small. There are many anthropogenic factors that are regulated by Federal and State agencies, and there are natural factors that cannot be regulated. Also to be considered is the variability in Gulf of Mexico fish populations that vary in numbers from year to year due to natural factors such as spawning success and juvenile survival.

Overall, the commercial fish and shellfish populations have remained healthy in the Gulf of Mexico in spite of the OCS activities. In recent years, since 2005, the major contributors to the lower fisheries catches in the Gulf of Mexico have been hurricanes (Katrina, Rita, Gustav, and Ike), fisheries closures due to the *Deepwater Horizon* explosion, oil spill, and cleanup, and freshwater diversions initiated by the State of Louisiana due to the oil spill associated with the *Deepwater Horizon* explosion in 2010 and the Mississippi River flooding in 2011, as well as possibly overfishing and bycatch.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Since the publication of the Multisale EIS, new commercial fisheries values for the year 2011 became available. These numbers are included here. All commercial fisheries data referenced in this section were obtained from NMFS (USDOC, NMFS, 2012d).

The Gulf of Mexico provided 40 percent, 33 percent, and 42 percent of the number of pounds of seafood landed in the United States (with the exception of Alaska) in the years 2009, 2010, and 2011 respectively. This amounted to approximately 25 percent, 22 percent, and 24 percent of the dollar value of the total catch for each of these respective years in the United States, again excluding Alaska.

In the WPA (Texas), for the years 2010 and 2011 the two most important finfish species landed were, in order of pounds landed, black drum (*Pogonias cromis*) and red snapper (*Lutjanus campechanus*). In 2010, the catch of black drum was approximately 1.7 million pounds worth nearly $1.6 million. In 2011, the black drum catch was nearly 1.8 million pounds worth nearly $1.5 million. Red snapper landings in

Texas in 2010 were 1.0 million pounds valued at approximately $3 million. The 2011 landings were 950 thousand pounds valued approximately $3.3 million.

In 2010, brown shrimp (*Farfantepenaeus aztecus*) production in Texas was 48.3 million pounds and the catch value was $99 million. There were, however, extensive fisheries closures in 2010 during and after the *Deepwater Horizon* explosion, oil spill, and cleanup. In 2011, the brown shrimp production was 59.4 million pounds worth approximately $133 million. White shrimp (*Litopenaeus setiferus*) production in Texas in 2010 was 27.3 million pounds with a catch value of $70.9 million, and in 2011 it was nearly 27 million pounds worth $78 million. Texas blue crab (*Callinectes sapidus*) catch in 2010 was 3.4 million pounds worth approximately $3.1 million, and it dropped in 2011 to 2.9 million pounds worth approximately $2.9 million.

The Eastern oyster (*Crassostrea virginica*) is also harvested in Texas estuaries from Galveston Bay west to East Matagorda Bay. Historically, the largest oyster harvest in Texas comes from Galveston Bay because of its favorable salinity regime. Oyster harvest in Texas in 2010 was approximately 5.3 million pounds valued at $19.1 million. The harvest in 2011 dropped to 3.9 million pounds valued at $12.8 million.

Stock Status

The NMFS reports each year to the Congress and Fishery Management Councils on the status of all fish stocks in the Nation. As of the 2011 status report (USDOC, NMFS, 2012e), overfished species in the Gulf of Mexico are red snapper, greater amberjack, gag grouper, and gray triggerfish. Although the report has been updated, there have been no changes in the species considered overfished in the Gulf of Mexico.

A search of the referenced literature revealed a study of blue fin tuna larvae (Muhling et al., 2012), also a species of concern during the *Deepwater Horizon* explosion, oil spill, and cleanup. The Atlantic stocks of blue fin tuna, a highly prized commercial species, spawn in the Gulf of Mexico in early summer. This study, however, found using satellite-derived estimates of oil coverage and spawning habitat models that less than 10 percent of blue fin tuna spawning habitat was predicted to have been covered by surface oil and that less than 12 percent of larval blue fin tuna were predicted to have been located within contaminated waters in the northern GOM, on a weekly basis. This study model is preliminary evidence that the larval mortality as a result of the *Deepwater Horizon* explosion, oil spill, and cleanup was not a catastrophic event for the 2010 year class of the population of Atlantic blue fin tuna.

The effects of a catastrophic event, such as the *Deepwater Horizon* explosion, oil spill, and cleanup, on commercial fisheries are preliminary and mostly speculative at this point. Data are unavailable, and it may take several years to acquire the necessary data and analyze it regarding long-term effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on all Gulf of Mexico commercial fisheries populations. The NRDA action will spearhead these efforts, but it has not published relevant data. Regardless of the costs of acquiring these data, given the realities of the NRDA process, these data will not be available within the timeframe contemplated by this NEPA analysis. In any event, this information is not essential to a reasoned choice among the alternatives because catastrophic events remain extremely low-probability events.

Summary and Conclusion

BOEM has reexamined the analysis for commercial fisheries presented in the 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 commercial fisheries presented in the 2012-2017 WPA/CPA Multisale EIS. While there was an increase to the percentage of pounds of commercial seafood landed in the GOM in 2011, as compared with 2010, there is still uncertainty as to what degree the fisheries closures in 2010 affected stocks. The new study found that the overlap between the blue fin tuna spawning habitat and surface oil coverage in the Gulf of Mexico from the *Deepwater Horizon* explosion, oil spill, and cleanup was approximately 10 percent and that less than 12 percent of the larval blue fin tuna BFT were predicted to have been located in contaminated waters on a weekly basis. This study is preliminary evidence that the *Deepwater Horizon* explosion, oil spill, and cleanup was not a catastrophic event for the 2010 year class of blue fin tuna. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS, therefore, still apply for proposed WPA Lease Sale 233.

4.1.1.17. Recreational Fishing

BOEM has reexamined the analysis for recreational fishing presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for recreational fishing presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of recreational fishing can be found in Chapter 4.1.1.17.1 of the 2012-2017 WPA/CPA Multisale EIS.

Healthy fishery stocks depend on EFH waters and substrate necessary to fish for spawning, breeding, feeding, and growing to maturity. Since the majority of the recreational species harvested within the WPA are estuary dependent, coastal environmental degradation resulting from the WPA proposed action, although indirect, has the potential to adversely affect EFH and recreational fisheries. Wetlands and estuaries in the WPA may be affected by activities resulting from the WPA proposed action. These activities include construction of new onshore facilities in wetland areas, pipeline emplacement in wetland areas, vessel usage of navigation channel and access canals, maintenance of navigation channels, inshore disposal of OCS-generated petroleum field wastes, and spills from both coastal and offshore OCS-support activities. Most of the wetlands loss in the WPA, however, is a result of residential and industrial development in wetlands. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on recreational fishing can be found in Chapter 4.1.1.17.2 of the 2012-2017 WPA/CPA Multisale EIS.

There may be minor space-use conflicts with recreational fishermen during the initial phases of the WPA proposed action. The WPA proposed action may also lead to low-level environmental degradation of fish habitat, which would negatively impact recreational fishing activity. However, these minor negative effects would likely be outweighed by the beneficial role that oil rigs serve as artificial reefs for fish populations. The degree to which oil platforms will become a part of a particular State's Rigs-to-Reefs program will be an important determinant of the degree to which the WPA proposed action will impact recreational fishing activity in the long term.

The most direct manner in which oil spills and other accidental events could impact recreational fishing activity would be through their effects on fish and their habitats in the affected areas. A spill could either contaminate fish in the immediate area or cause fish to move during the duration of the spill. A spill would likely cause more direct harm to larvae and eggs than adults, which could possibly affect recreational species in the longer term. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on recreational fishing can be found in Chapters 4.1.1.17.3 of the 2012-2017 WPA/CPA Multisale EIS.

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. A large spill such as the one associated with the *Deepwater Horizon* explosion can have more substantial effects due to the larger potential closure regions and due to the wider economic implications such closures can have. Public perceptions of fish contamination would also play a more important role subsequent to a large oil spill. However, the longer-term implications of a large oil spill would primarily depend on the extent to which fish ecosystems recover after the spill has been cleaned.

The cumulative impacts to recreational fishing activity will arise from the WPA proposed action, the existing OCS Program, and the expected progression of the recreational fishing industry in the Gulf of Mexico. These impacts will arise from the cumulative effects on fish resources in the Gulf of Mexico. The cumulative impacts to fish resources in the Gulf of Mexico include wetland loss, marine/estuary water quality degradation, damage to live bottoms, structure removals, petroleum spills, subsurface blowouts, pipeline trenching, and discharges of drilling mud and processed waters on fish resources. Because many of the recreationally sought fishes are also harvested commercially, a number of the cumulative impacts to the recreational fishing industry are similar to those of the commercial fishing

industry. This is true even though recreational fishing is primarily confined to smaller, closer inshore areas of the Gulf of Mexico than commercial fishing. The cumulative impacts to the commercial fishing industry include commercial fishing practices, hurricanes, installation of production and underwater obstructions, platform removals, seismic surveys, petroleum spills, subsurface blowouts, pipeline trenching, and the offshore discharge of drilling mud and produced waters. The cumulative impacts unique to recreational fishing activity will arise from State and Federal fisheries management plans, the role of oil platforms as artificial reefs, and the lingering impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on recreational fishing can be found in Chapter 4.1.1.17.4 of the 2012-2017 WPA/CPA Multisale EIS.

The WPA proposed action and the broader OCS Program have varied effects on recreational fishing activity. The OCS Program has generally enhanced recreational fishing opportunities due to the role of oil platforms as artificial reefs. This effect depends importantly on the extent to which rigs are removed at decommissioning or are maintained through Rigs-to-Reefs programs. However, oil spills can have important negative consequences on recreational fishing activity due to the resultant fishing closures and longer-term effects oil spills can have on fish populations. This was evident during the *Deepwater Horizon* explosion, oil spill, and cleanup, the effects of which are not yet certain. However, this type of catastrophic spill event is rare. The contribution of the WPA proposed action to these positive and negative cumulative effects would be minimal because of the relatively small amount of activity expected with the WPA proposed action. In addition, 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.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

BOEM examined a variety of Internet sources, as well as known data providers, for new information regarding the impacts of the WPA proposed action on recreational fishing. The primary new data source is an annual update to recreational fishing data in Texas (Fisher, official communication, 2012). This update provides data on both the species caught and the amount of angler effort in 2011 (the data for prior years is unchanged). **Table 4-3** provides data on the number of recreational fishing trips during each season of 2009, 2010, and 2011. Texas has historically divided its data into two fishing seasons: Season A (November 21-May 14) and Season B (May 15-November 20). **Table 4-3** shows that there were 1,041,027 angler trips in 2009; 987,537 angler trips in 2010; and 1,125,400 angler trips in 2011. Therefore, while recreational fishing activity fell slightly in 2010, it recovered to a level in 2011 that was higher than in 2009. This pattern was evident for both bay fishing and fishing in Texas Territorial State waters; this pattern was also evident during each of the two fishing seasons. Fishing in the Exclusive Economic Zone (which is the area farthest from shore) was still somewhat lower in 2011 than in 2009; however, fishing in the Exclusive Economic Zone comprises a small portion of total recreational fishing activity in Texas.

Table 4-4 provides data regarding the individual species caught by anglers in Texas during 2008, 2009, 2010, and 2011. For most species, the number of fish landed in 2011 was quite high compared with previous years. Indeed, in 2011, catch of Atlantic croaker, red drum, sand seatrout, sheepshead, southern flounder, and spotted seatrout was higher than was exhibited during each of the prior 3 years. These high catch levels were particularly evident for bay fishing, while fishing in State waters and in the Exclusive Economic Zone were roughly comparable to catch levels in prior years.

Summary and Conclusion

BOEM has reexamined the analysis for recreational fishing presented in the 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 recreational fishing presented in the 2012-2017 WPA/CPA Multisale EIS. This is because the updated recreational fishing data for Texas was roughly in line with prior expectations. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.18. Recreational Resources

BOEM has reexamined the analysis for recreational resources presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for recreational resources presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of recreational resources can be found in Chapter 4.1.1.18.1 of the 2012-2017 WPA/CPA Multisale EIS.

Routine OCS oil and gas activities can affect recreation and tourism in diverse ways. The OCS activities can have direct negative impacts on beach and coastal recreational resources through discharges of marine debris, noise, and visual impairments. There are also possible indirect impacts on local recreational resources from space-use conflicts and from increased economic activity from OCS operations. The unique role that oil platforms can play as artificial reefs should also be accounted for when considering policy actions. Finally, the possible effects of public perceptions on tourism, particularly in light of the *Deepwater Horizon* explosion, oil spill, and cleanup, should be considered. However, while impacts on recreational resources from routine OCS activities can occur from a number of sources, in total they are likely to be reasonably small in scale. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on recreational resources can be found in Chapter 4.1.1.18.1 of the 2012-2017 WPA/CPA Multisale EIS.

Routine OCS actions in the WPA can cause minor disturbances to recreational resources, particularly beaches, through increased levels of noise, debris, and rig visibility. The OCS activities can also change the composition of local economies through changes in employment, land use, and recreation demand. The WPA proposed action has the potential to directly and indirectly impact recreational resources along the coast of Texas. However, the small scale of the WPA 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 recreational resources most vulnerable to an oil spill are the beaches and nature parks along the Gulf Coast. The effects of an oil spill on a particular beach region will depend on the success of the containment and cleanup operations following an oil spill. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on recreational resources can be found in Chapter 4.1.1.18.2 of the 2012-2017 WPA/CPA Multisale EIS.

Spills most likely to result from the WPA 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. However, these effects are also likely to be small in scale and of short duration. In the unlikely event that a spill occurs that is sufficiently large to affect large areas of the coast and, through public perception, has effects that reach beyond the damaged area, the effects to recreation and tourism could be substantial, at least in the short term.

The cumulative impacts to recreational resources would be attributed to the WPA proposed action, the existing OCS Program, and the expected impacts of external events and actions to recreational resources and tourism activity. The WPA proposed action could contribute to a number of aesthetic and space-use issues arising from existing oil and gas programs. The OCS activities can also impact the recreational uses of beaches and wetland areas, which are already being impacted through coastal erosion. Finally, lingering impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup could contribute to the incremental impacts of an oil spill, should one arise from the WPA proposed action. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on recreational resources can be found in Chapter 4.1.1.18.3 of the 2012-2017 WPA/CPA Multisale EIS.

The WPA proposed action could contribute to the aesthetic impacts and space-use conflicts that arise due to the broader OCS Program. Oil spills could also contribute to the overall degradation of beach and

wetland-based recreational resources. The dynamics of any future oil spill will also be influenced by the damage done and lessons learned from the *Deepwater Horizon* explosion, oil spill, and cleanup. However, the cumulative impacts of the WPA proposed action on recreational resources are small since the incremental increase in the probability of a large spill is also low. The incremental contribution of the WPA proposed action is expected to be minimal in light of all non-OCS-related activities such as aesthetic impacts (including from other industrial sources), wetland loss, and space-use conflicts.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of information sources (such as Internet articles and known economic data providers) was conducted to determine the availability of recent information related to recreational resources. The primary new information source is updated data from the U.S. Department of Labor, Bureau of Labor Statistics (2012) regarding the levels of employment in recreational industries in geographic areas along the Gulf Coast. **Table 4-5** presents annual data on the level of employees in recreational industries from 2008 through 2011. As can be seen, recreational employment was higher in December 2011 than in December 2009 in all 13 economic impact areas (EIA's) along the Gulf Coast. These data provide further confirmation that, in aggregate, the recreational industries along the Gulf Coast have mostly recovered from the *Deepwater Horizon* explosion, oil spill, and cleanup. However, the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup are difficult to disentangle from the impacts of overall economic conditions. The high unemployment that persists nationwide has likely had a particular impact on tourism activity since people are more likely to cut back on recreation than other more basic necessities.

Incomplete or unavailable information related to recreational resources may be relevant to reasonably foreseeable adverse impacts on these resources, as described in this section and in the 2012-2017 WPA/CPA Multisale EIS. With regard to the *Deepwater Horizon* explosion, oil spill, and cleanup, BOEM has determined that the incomplete or unavailable information would not be essential to a reasoned choice among alternatives for the reasons described herein and in the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

BOEM has reexamined the analysis for recreational resources presented in the 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 recreational resources presented in the 2012-2017 WPA/CPA Multisale EIS. This is because the new data on recreational employment was roughly in line with prior expectations. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.19. Archaeological Resources

4.1.1.19.1. Historic

BOEM has reexamined the analysis for historic archaeological resources presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of historic archaeological resources can be found in Chapter 4.1.1.19.1.1 of the 2012-2017 WPA/CPA Multisale EIS.

Routine impact-producing factors associated with the WPA proposed action that could affect historical 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; pipeline placement; dredging of new channels, as well as maintenance dredging of existing channels;

anchoring activities; pipeline installation; post-decommissioning trawling clearance; and the masking of archaeological resources from industry-related debris. A detailed impact analysis of the routine impacts from OCS activities associated with proposed WPA Lease Sale 233 on historic archaeological resources can be found in Chapter 4.1.1.19.1.2 of the 2012-2017 WPA/CPA Multisale EIS.

The greatest potential impact to an archaeological resource as a result of the WPA proposed action would result from direct contact between an offshore activity (i.e., platform installation, drilling rig emplacement, and dredging or pipeline project) and a historic site. Archaeological surveys, where required prior to an operator beginning oil and gas 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 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 notify BSEE's Regional Director of the discovery of any potential archaeological resources.

Offshore oil and gas activities resulting from the WPA proposed action could impact an archaeological resource because of incomplete knowledge on the location of these sites in the Gulf. The risk of contact to archaeological resources is greater in instances where archaeological survey data are unavailable. Such an event could result in the disturbance or destruction of important archaeological information. Archaeological surveys would provide the necessary information to develop avoidance strategies that would reduce the potential for impacts on archaeological resources.

Except for the projected 0-1 new gas processing facilities and 0-1 new pipeline landfalls, the WPA 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 on historic archaeological resources could occur as a result of an accidental oil spill. A major effect from an oil spill would be visual contamination of a historic coastal site, such as a historic fort or lighthouse. Although such effects may be temporary and reversible, cleaning oil from historic structures is by no means a simple or inexpensive process (e.g., Chin and Church, 2010). The use of dispersants, however, could result in chemical contamination of submerged cultural heritage sites. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on historic archaeological resources can be found in Chapter 4.1.1.19.1.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events producing oil spills may threaten archaeological resources along the Gulf Coast. Should a spill contact a historic archaeological site (including submerged sites), damage might include direct impact from oil-spill cleanup equipment, contamination of materials, and/or looting. Previously unrecorded sites could be impacted by oil-spill cleanup operations on beaches and offshore. The major effect from an oil-spill impact would be visual contamination of a historic coastal site, such as a historic fort or lighthouse. It is expected that any spill cleanup operations would be considered a Federal action for the purposes of Section 106 of the National Historic Preservation Act and would be conducted in such a way as to cause little or no impacts to historic archaeological resources. Recent research suggests the impact of direct contact of oil on historic properties may be long term and not easily reversible without risking damage to fragile historic materials (Chin and Church, 2010). Detailed risk analyses of offshore oil spills ranging from ≥1,000 bbl, ≤1,000 bbl, and coastal spills associated with the WPA proposed action are provided in **Chapters 3.2.1.5, 3.2.1.6, and 3.2.1.7** of this Supplemental EIS and in Chapters 3.2.1.5, 3.2.1.6, and 3.2.1.7 of the 2012-2017 WPA/CPA Multisale EIS, respectively. 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.

The potential for spills is low, the effects would generally be localized, and the cleanup efforts would be regulated. The WPA proposed action, therefore, is not expected to result in impacts to historic archaeological sites; however, should such an impact occur, unique or significant archaeological information could be lost and this impact could be irreversible.

Of the cumulative scenario activities, those that could potentially impact historic archaeological resources include the following: (1) the OCS Program; (2) State oil and gas activity; (3) maintenance dredging; (4) OCS sand borrowing; (5) artificial rigs-to-reefs development; (6) offshore LNG projects; (7) renewable energy and alternative use conversions; (8) commercial fishing; (9) sport diving and commercial treasure hunting, and (10) hurricanes. A detailed impact analysis of the cumulative impacts

of OCS activities associated with proposed WPA Lease Sale 233 on historic archaeological resources can be found in Chapter 4.1.1.19.1.4 of the 2012-2017 WPA/CPA Multisale EIS.

Several impact-producing factors may threaten historic archaeological resources, all related to bottom-disturbing activities. An impact could result from contact between historic shipwreck located on the OCS and OCS Program or State oil and gas activities (i.e., pipeline and platform installations, drilling rig emplacement and operation, dredging, and anchoring activities). Bottom-disturbing activities on the OCS also include maintenance dredging, sand borrowing, transported artificial reef emplacement, LNG facility construction, and renewable energy facility construction. With the exception of maintenance dredging, preconstruction surveys may be required by BOEM or the permitting agency. Impacts resulting from the imperfect knowledge of the location of historic resources may still occur in areas where a high-resolution survey is only required at 300-m (98-ft) survey intervals or not at all. The OCS development prior to requiring archaeological surveys has been documented to have impacted wrecks containing significant or unique historic information. This was amply demonstrated when a pipeline was laid across a previously unknown early 19th-century shipwreck and when an MODU mooring anchor chain cut a shipwreck in half (Atauz et al., 2006; Church and Warren, 2008). The archaeological resources regulation at 30 CFR 250.194 grants authority in certain cases to the BSEE and BOEM Regional Directors to require archaeological reports to be submitted with the EP, DOCD, or DPP where deemed necessary. As part of the environmental reviews conducted for postlease activities, available information will be evaluated regarding the potential presence of archaeological resources within the WPA proposed action area to determine if additional archaeological resource surveys and mitigation are warranted.

The loss or discard of steel debris associated with oil and gas exploration and development and trawling activities could result in the masking of historic shipwrecks or the identification of false negatives on archaeological surveys (an anomaly that does not appear to be of historical significance, but actually is).

Damage to or loss of significant or unique historic archaeological information from commercial fisheries (trawling) is highly likely in water depths <660 ft (200 m) (Foley, 2010). It is expected that maintenance dredging, commercial bottom trawling, sport diving and commercial treasure hunting, and hurricanes and tropical storms have impacted and will continue to impact historic period shipwrecks.

Development onshore as a result of the WPA proposed action could result in the direct physical contact between a historic site and pipeline trenching. It is assumed that archaeological investigations prior to construction will serve to mitigate these potential impacts. The expected effects of oil spills on historic coastal resources are temporary and reversible.

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 of the past within the cumulative activity area, it is reasonable to assume that most impacts would have occurred prior to 1973 (the date of initial archaeological survey and site clearance requirements). The incremental contribution of the WPA proposed action is expected to be very small due to the efficacy of the required remote-sensing survey and archaeological report 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 imbedded 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 (i.e., rig emplacement, pipeline trenching, anchoring, and other ancillary activities) and a historic shipwreck. The incremental contribution of the WPA proposed action is expected to be very small due to the efficacy of the remote-sensing surveys and archaeological reports, where required.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of Internet information sources, as well as interviews with Larry Murphy, Historic Properties Specialist Officer for the Section 106 response to the *Deepwater Horizon* explosion, oil spill, and cleanup, and Dan Odess, DOI consulting archaeologist, were conducted to determine the availability of recent information. 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 WPA. These Internet sources included various online indexes to periodical literature, such as EBSCO Online (http://web.ebscohost.com), JSTOR (http://www.jstor.org/), the National Technical Information Service's National Technical Reports Library (https://ntrlr3.ntis.gov), and ScienceDirect (http://www.sciencedirect.com/). The search revealed a recent interim report describing activities to support response activities related to the *Deepwater Horizon* explosion, oil spill, and cleanup and to evaluate the impact or potential impact of the event and subsequent cleanup operations to previously recorded and unidentified cultural resources. This cultural resources undertaking involves both Federal and State undertakings within the States of Louisiana, Mississippi, Alabama, and Florida. The cultural resources investigation for the *Deepwater Horizon* explosion, oil spill, and cleanup was managed as a component of the Shoreline Cleanup Assessment Techniques (SCAT) process, and archaeologists have been involved throughout the SCAT process. Cultural resources investigations utilized a combination of pedestrian surveys, shovel testing, auger test sampling, and trench sampling. In addition, archaeological and Tribal monitors have been embedded with all cleanup operations. This report summarizes the findings of the pre-field investigations, field surveys, and cleanup monitoring associated with the response to the *Deepwater Horizon* explosion and oil spill up until March 31, 2011 (HDR, 2011). Although this study provides information on the potential impacts from an oil spill and associated cleanup operations, it was confined to examining coastal areas most likely to have been affected by the *Deepwater Horizon* explosion, oil spill, and cleanup, which do not include any known or potential cultural resources within the WPA.

In April 2012, BOEM, working with NOAA's Office of Ocean Exploration and Research from the research vessel *Okeanos Explorer* investigated a sonar target reported by Shell Oil in over 1,200 m (4,000 ft) of water in an area of the CPA almost 200 mi (320 km) offshore where an archaeological survey had previously not been required. The target proved to be the intact remains of an armed sailing ship dating from around 1800 to 1840. This important discovery highlights situations where site-specific surveys prior to bottom-disturbing activities may help to mitigate potential impacts.

Although information on the impacts of a potential spill to archaeological resources is incomplete or unavailable at this time, as described in this section and in the 2012-2017 WPA/CPA Multisale EIS, and may be relevant to reasonably foreseeable adverse impacts on these resources, 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 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 historic archaeological resources presented in the 2012-2017 WPA/CPA Multisale EIS because the only new relevant document described the survey procedures undertaken by SCAT teams and a summation of site discoveries. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.19.2. Prehistoric

BOEM has reexamined the analysis for prehistoric archaeological resources presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of prehistoric archaeological resources can be found in Chapter 4.1.1.19.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

Offshore development as a result of the WPA proposed action could result in an interaction between a drilling rig, platform, pipeline, dredging activity, or anchors and an inundated prehistoric site. 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 contacts for North America, Central America, South America, and the Caribbean. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on prehistoric archaeological resources can be found in Chapter 4.1.1.19.2.2 of the 2012-2017 WPA/CPA Multisale EIS.

The greatest potential impact to an archaeological resource as a result of the WPA proposed action would result from direct contact between an offshore activity (i.e., platform installation, drilling rig emplacement, and dredging or pipeline project) and a prehistoric site. Prehistoric archaeological sites are thought potentially 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. The archaeological surveys, 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 possible archaeological sites. The NTL 2005-G07 suggests a 300-m (984-ft) linespacing for remote-sensing surveys of leases within areas having a high potential for prehistoric sites. While surveys 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 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/or unique archaeological information.

Oil spills resulting from a well blowout in the WPA and related spill-response activities have the potential to impact cultural resources near the spill site and landfall areas. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on prehistoric archaeological resources can be found in Chapter 4.1.1.19.2.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events producing oil spills may threaten archaeological resources along the Gulf Coast. 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. Previously unrecorded sites could be impacted by oil-spill cleanup operations on beaches. Detailed risk analyses of offshore oil spills ranging from ≥1,000 bbl, <1,000 bbl, and coastal spills that may be associated with the WPA proposed action are provided in Chapters 3.2.1.5, 3.2.1.6, and 3.2.1.7 of the 2012-2017 WPA/CPA Multisale EIS, respectively. 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 WPA proposed action. The WPA proposed action, therefore, is not expected to result in impacts to prehistoric archaeological sites.

Several impact-producing factors may threaten prehistoric archaeological resources of the Gulf of Mexico. An impact could result from contact between proposed oil and gas activities (including pipeline construction, platform installation, drilling rig emplacement and operation, dredging, and anchoring activities) and an oil spill and subsequent cleanup efforts. Each of these activities or events could damage and destroy a prehistoric archaeological site located on the continental shelf. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on prehistoric archaeological resources can be found in Chapter 4.1.1.19.2.4 of the 2012-2017 WPA/CPA Multisale EIS.

Archaeological surveys, where required, and the resulting archaeological analyses completed prior to an operator beginning oil and gas activities on a lease are expected to be highly effective at identifying possible prehistoric sites. The OCS development prior to the first required archaeological survey in 1973 has possibly impacted sites containing significant or unique prehistoric information, and it is possible that, even with current survey methods, prehistoric archaeological sites may be missed. No significant new information was found at this time that would alter the overall conclusion that cumulative impacts on prehistoric archaeological sites associated with the WPA proposed action is expected to be minimal. Because of continued regulations and surveys, where required, potential impact from the WPA proposed action to prehistoric archeological resources would be decreased.

Should an oil spill occur and contact a coastal prehistoric site, loss of significant or unique information could result. Oil spills have the potential to impact coastal prehistoric sites directly or indirectly by physical impacts caused by oil-spill cleanup operations.

The initial dredging of ports and navigation channels and tropical storms are assumed to have caused the localized loss of significant or unique archaeological information.

Onshore development as a result of the OCS Program could result in the direct physical contact between a prehistoric site and new facility construction and pipeline trenching. It is assumed that archaeological investigations prior to construction would serve to mitigate these potential impacts.

The shallow depth of sediment disturbance caused by commercial fisheries activities (trawling) is not expected to exceed that portion of the sediments that have been disturbed by wave-generated forces.

The effects of the various impact-producing factors discussed in this 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 would have occurred prior to 1973 (the date of initial archaeological survey and clearance requirements). The incremental contribution of the WPA 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 the 2012-2017 WPA/CPA Multisale EIS

A search of Internet information sources, as well as interviews with Larry Murphy, Historic Properties Specialist Officer for the Section 106 response to the *Deepwater Horizon* explosion, oil spill, and cleanup, and Dan Odess, DOI consulting archaeologist, were conducted to determine the availability of recent information. 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 WPA. These Internet sources included various online indexes to periodical literature such as EBSCO Online (http://web.ebscohost.com), JSTOR (http://www.jstor.org/), the National Technical Information Service's National Technical Reports Library (https://ntrlr3.ntis.gov), and ScienceDirect (http://www.sciencedirect.com/). The search revealed a recent interim report describing activities to support response activities related to the *Deepwater Horizon* explosion, oil spill, and cleanup and to evaluate the impact or potential impact of the event and subsequent cleanup operations to previously recorded and unidentified cultural resources. This cultural resources undertaking involves both Federal and State undertakings within the States of Louisiana, Mississippi, Alabama, and Florida. The cultural resources investigation for the *Deepwater Horizon* explosion, oil spill, and cleanup was managed as a component of the SCAT process, and archaeologists have been involved throughout the SCAT process. Cultural resources investigations utilized a combination of pedestrian surveys, shovel testing, auger test sampling, and trench sampling. In addition, archaeological and Tribal monitors have been embedded with all cleanup operations. This report summarizes the findings of the pre-field investigations, field surveys, and cleanup monitoring associated with the response to the *Deepwater Horizon* explosion and oil spill up until March 31, 2011 (HDR, 2011). Although this study provides information on the potential impacts from an oil spill and associated cleanup operations, it was confined to examining coastal areas most likely to have been affected by the *Deepwater Horizon* explosion, oil spill, and cleanup, which do not include any known or potential cultural resources within the WPA.

Although information on the impacts of a potential spill to archaeological resources is incomplete or unavailable at this time, as described in this section and in the 2012-2017 WPA/CPA Multisale EIS, and although it may be relevant to reasonably foreseeable adverse impacts on these resources, the information is not essential to a reasoned choice among alternatives. An oil spill occurring and contacting an archaeological resource is unlikely, given that oil released tends to rise quickly to the surface and that the average size of any spill would be small.

Summary and Conclusion

BOEM has reexamined the analysis for prehistoric archaeological resources presented in the 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 prehistoric archaeological resources presented in the 2012-2017 WPA/CPA Multisale EIS because the only new relevant document described the survey procedures undertaken by SCAT teams and a summation of site discoveries. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.20. Human Resources and Land Use

4.1.1.20.1. Land Use and Coastal Infrastructure

BOEM has reexamined the analysis for land use and coastal infrastructure presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of land use and coastal infrastructure can be found in Chapter 4.1.1.20.1.1 of the 2012-2017 WPA/CPA Multisale EIS.

Impact-producing factors associated with the WPA proposed action that could affect land use and coastal infrastructure include gas processing facilities, pipeline landfalls, service bases, navigation channels, and waste disposal facilities. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on land use and coastal infrastructure can be found in Chapter 4.1.1.20.1.2 of the 2012-2017 WPA/CPA Multisale EIS.

The impacts of routine events associated with the WPA proposed action are uncertain due to the post-*Deepwater Horizon* environment, the effects of the drilling suspension, the changes in Federal requirements for drilling safety, and the current pace of permit approvals. BOEM projects 0-1 new gas processing facilities and 0-1 new pipeline landfalls for the WPA proposed action. However, based on the most current information available, there is only a very slim chance that either would result from the WPA proposed action, and if a new gas processing facility or pipeline landfall were to result, it would likely occur toward the end of the 40-year analysis period. The likelihood of a new gas processing facility or pipeline landfall is much closer to zero than to one (Dismukes, official communication, 2011). BOEM anticipates that there would be maintenance dredging of navigation channels and an increase in activity at services bases as a result of the WPA proposed action. If drilling activity recovers post-*Deepwater Horizon* and increases, there may be new increased demand for a waste disposal services as a result of the WPA proposed action. Because of the current near zero estimates for a pipeline landfall and gas processing facility construction, the routine activities associated with the WPA proposed action would have little effect on land use.

As a result of the *Deepwater Horizon* explosion, oil spill, and cleanup, it is too early to determine substantial, long-term changes in routine event impacts to land use and infrastructure. BOEM anticipates these changes will become apparent over time. Therefore, BOEM recognizes the need to continue monitoring all resources for changes that are applicable for land use and infrastructure. In regard to land use and infrastructure, it does not appear that there would be adverse impacts from routine events associated with the WPA proposed action.

Accidental events (impact-producing factors) associated with the WPA proposed action that could affect land use and coastal infrastructure include oil spills, vessel collisions, and chemical/drilling-fluid spills. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on land use and coastal infrastructure can be found in Chapter 4.1.1.20.1.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events associated with the WPA proposed action could occur at different levels of severity, based in part on the location and size of the event. The typical types of accidental events that could affect land use and coastal infrastructure include oil spills, vessel collisions, and chemical/drilling-fluid spills. These may occur anywhere across the spectrum of severity. Typically, accidental events related to OCS activities are generally smaller in scale based on historic experience, and they must be distinguished from low-probability catastrophic events such as the *Deepwater Horizon* explosion, oil spill, and cleanup. Typically, the impact of small-scale oil spills, vessel collisions, and chemical/drilling fluid spills are not likely to last long enough to adversely affect overall land use or coastal infrastructure in the analysis area.

Many of the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup to land use and infrastructure have been temporary and short-term, such as the ship decontamination sites and the waste staging areas established in the immediate aftermath of the *Deepwater Horizon* explosion (USDOT, Bureau of Transportation Statistics, 2010). The indirect effects on infrastructure use are still rippling through the industry, but this should resolve as issues with the suspensions, rate of permitting, and other matters are resolved. With regards to land use and infrastructure, the post-*Deepwater Horizon* environment remains somewhat dynamic, and BOEM will continue to monitor these resources over time and to document short- and long-term *Deepwater Horizon* explosion-related impacts. In the future, the long-term impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup will be clearer as time allows the production of peer-reviewed research and targeted studies that determine those impacts. The *Deepwater Horizon* explosion, oil spill, and cleanup was a low-probability catastrophic event. The kinds of accidental events that are likely to result from the WPA proposed action are not likely to significantly affect land use and coastal infrastructure. This is because accidental events offshore would have a small probability of impacting onshore resources. Also, if an accident occurs nearshore, it would most probably be near a facility; therefore, the impacts would be temporary and localized because of the decrease in response time.

The cumulative analysis considers both existing land-use patterns and the effects of impact-producing factors from OCS and State oil and gas activities. The OCS- and State-related factors consist of prior, current, and future OCS and State lease sales. The vast majority of this infrastructure also supports oil and gas production in State waters as well as in coastal areas onshore. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on land use and coastal infrastructure can be found in Chapter 4.1.1.20.1.4 of the 2012-2017 WPA/CPA Multisale EIS.

For the WPA proposed action, the primary region of geographic influence is coastal Texas, Louisiana, Mississippi, and Alabama. Land-use patterns vary greatly by region, reflecting differences in soils, climate, topography, and patterns of population settlement. Mississippi and Louisiana are located in what the U.S. Department of Agriculture's Economic Research Service calls the Delta farm production region, while Alabama is located in the Southeast farm production region and Texas is located in the Southern Plain region (Lubowski et al., 2006). The Economic Research Service conducts land-use inventories based on available land-use data obtained from surveys conducted both by the Economic Research Service and predecessor agencies.

This analysis focuses only on those Gulf Coast States that could be impacted by the WPA proposed action, i.e., Alabama, Mississippi, Louisiana, and Texas. 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, which includes cropland harvested, crop failure, cultivated summer fallow, cropland used only for pasture, and idle 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. For all four coastal states, 42 percent of the total land area is used for grassland pasture and range, with Texas devoting 61 percent of close to 262,000 mi^2 (679,095 km^2) for grassland pasture and range. Forest land, which the U.S. Forest Service defines as land at least 10 percent stocked by trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated, makes up 28 percent of the total land area in these four coastal states. Alabama has the most forest use land, with 70 percent of the State's 53,868 mi^2 (139,517 km^2) covered in forest, followed by Mississippi with 65 percent of its total land area covered in forest. Forest use land includes timberland, reserved forest land, but it excludes forest land in parks, wildlife areas, and similar special purpose uses. Special use areas, which include areas in highway, road, and railroad rights-of-way and airports; Federal and State parks, wilderness areas, and wildlife refuges; and national defense and industrial areas, make up 4 percent of the total land area for these four coastal states. Louisiana has the highest percentage of special use area, with 7 percent of the land used for special-use purposes (Lubowski, et al., 2006).

Census urban areas include densely populated areas with at least 50,000 people ("urbanized areas") and densely populated areas with 2,500-50,000 people ("urban clusters"). Included in the Census urban area definition are residential areas and concentrations of nonresidential urban areas such as commercial, industrial, and institutional land; office areas; urban streets and roads; major airports; urban parks and recreational areas; and other land within urban defined areas. The total urban land area for all four states is just 3 percent of the total land area, with Louisiana and Alabama tied for the highest percentage of urban areas with 4 percent of each state being utilized for high population areas. The final land use category, "Miscellaneous," includes industrial and commercial sites in rural areas, cemeteries, golf

courses, mining areas, quarry sites, marshes, swamps, sand dunes, bare rocks, deserts, tundra, rural residential, and other unclassified land. For Alabama, Mississippi, and Texas, 4 percent of land use is classified as miscellaneous; however, in Louisiana, 16 percent of land use is classified as miscellaneous. Louisiana contains 40-45 percent of the wetlands found in the lower states within its 195,000-mi^2 (505,048-km^2) footprint (USDOI, GS, 2012a). Louisiana also has the greatest rate of landloss in the Nation. For a more detailed discussion on deltaic landloss, refer to **Chapter 4.1.1.4**.

The OCS-related demands upon coastal infrastructure and land use tend to be geographically concentrated as compared with historic residential settlement within the region. For instance, Port Fourchon is the service base for over 90 percent of OCS deepwater production and serves as a conduit for 15-18 percent of the Nation's entire oil supply (The Greater Lafourche Port Commission, 2011). As one of the most significant footprints within the OCS-related infrastructure corridor, Port Fourchon comprises only 2.7 developed square miles (7 km^2) within a close to 44,000-mi^2 (113,959-km^2) state. In Louisiana, there are 105 persons per square mile, and in Lafourche Parish (where Port Fourchon is located), there are 90 persons per square mile, both above the national average of 87 persons per square mile (USDOC, Census Bureau, 2010). The future of non-OCS-related land use and infrastructure will largely be determined by economic drivers that influence where people settle or relocate.

Activities relating to the OCS Program and State oil and gas production are expected to minimally affect the current land use of the analysis area because most subareas have strong industrial bases and designated industrial parks to accommodate future growth in oil and gas businesses. BOEM projects 0-1 new gas processing facilities and 0-1 new pipeline landfalls for the WPA proposed action, although this is a conservative estimate and the number is much closer to zero than to one. If a new gas processing facility or pipeline landfall were to occur, it would likely be toward the end of the 40-year analysis period (Dismukes, official communication 2011). There may be a new increased demand for waste disposal services as a result of the WPA proposed action. 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. However, in the cumulative case, it is possible that Port Fourchon expansions may eventually be constrained by surrounding wetlands. Based on the available information and current BOEM scenario projections, the cumulative impacts on land use and coastal infrastructure from OCS-related activities are expected to be minor. Therefore, the incremental contribution of the WPA proposed action to the cumulative impacts on land use and coastal infrastructure are also expected to be minor.

The coastal infrastructure supporting the WPA proposed action represents only a tiny portion of the coastal land and infrastructure throughout the WPA and Gulf of Mexico, and little change is expected to occur due to changing agricultural and extractive (e.g., lumbering and petroleum) uses of onshore land. Many non-OCS-related factors contribute substantially to the cumulative impacts to land use and coastal infrastructure, including 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; and changes in non-OCS-related demands for water transportation systems and ports. Given the overwhelming contribution of these non-OCS-related factors to the cumulative impacts on land use and coastal infrastructure and the small incremental contribution of the WPA proposed action, the cumulative impacts on land use and coastal infrastructure are also expected to be minor.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Additional research was conducted to investigate the availability of recent information affecting land use and coastal infrastructure since publication of the 2012-2017 WPA/CPA Multisale EIS. Various Internet sources were examined, including the websites of numerous Federal and State agencies (U.S. Department of Homeland Security, Federal Emergency Management Agency; U.S. Department of Commerce, 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; Texas Commission on Environmental Quality; Louisiana Recovery Authority; and Louisiana Office of Community Development). 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, TOLLROAD News, and *The Energy Journal*. This research revealed Sasol, Inc.'s plan to build a gas-to-liquids processing facility in Calcasieu Parish, Louisiana. This would be the first gas-to-liquids facility constructed in the United States. Plans call for an 18-month feasibility study to consider two development options, specifically, whether it will produce 2 million tons per year or 4 million tons per year (Troy, 2011). At present, BOEM believes that most of this gas will be sourced from onshore unconventional reserves rather than from OCS supplies. BOEM will continue to monitor future development of this new coastal infrastructure category (gas-to-liquids facilities), but this one proposed plan would not be expected to, on its own, represent a significant development or change in land use.

Summary and Conclusion

BOEM has reexamined the analysis for land use and coastal infrastructure presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented above. BOEM has determined that the additional information does not alter the impact conclusion for land use and coastal infrastructure because the plans to build the new gas-to-liquids facility are very preliminary and are dependent upon not only the outcome of the 18-month feasibility study but also future fluctuations in the natural gas market. Therefore, the analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.20.2. Demographics

BOEM has reexamined the analysis for demographics presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for demographics presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of demographics can be found in Chapter 4.1.1.20.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

The addition of any new human activity, such as oil and gas development resulting from the WPA proposed action, can affect local communities in a variety of ways. Typically, these effects are in the form of people and money, which can translate into changes in the local social and economic institutions. Minor demographic changes, primarily in focus areas, are projected as a result of the WPA proposed action. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on demographics can be found in Chapter 4.1.1.20.2.2 of the 2012-2017 WPA/CPA Multisale EIS.

The WPA proposed action is projected to minimally affect the demography of the analysis area. Population impacts from the WPA proposed action are projected to be minimal (<1% of the total population) for any EIA in the Gulf of Mexico region. The baseline population patterns and distributions, as projected and described in Chapter 4.1.1.20.2.1 of the 2012-2017 WPA/CPA Multisale EIS, are expected to remain unchanged as a result of the WPA proposed action. The increase in employment is expected to be met primarily with the existing population and available labor force, with the exception of some in-migration projected to occur in focal areas, such as Port Fourchon.

The addition of human activity associated with an oil-spill response can affect local communities in a variety of ways. Typically, these effects are short term and in the form of a temporary influx of people and money, which can translate into changes in the local social and economic institutions. Minor to no demographic changes, primarily in projected shoreline contact areas, are projected as a result of the WPA proposed action. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on demographics can be found in Chapter 4.1.1.20.2.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events associated with the WPA proposed action, such as oil or chemical spills, blowouts, and vessel collisions, would likely have no effects on the demographic characteristics of the Gulf coastal communities 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 and because net employment impacts from a spill are not expected to exceed 1 percent of baseline employment for any EIA in any given year.

The cumulative analysis considers the effects of OCS-related, impact-producing factors as well as non-OCS-related factors on demographics. The OCS-related factors consist of population and employment from prior, current, and future OCS lease sales. Non-OCS factors include fluctuations in workforce, net migration, relative income, oil and gas activity in State waters, and offshore LNG activity. Not considered in this analysis are the unexpected events that may influence oil and gas activity within the analysis area that cannot be predicted with reasonable accuracy. Examples of unexpected events include oil embargos and acts or war or terrorism. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on demographics can be found in Chapter 4.1.1.20.2.4 of the 2012-2017 WPA/CPA Multisale EIS.

The cumulative activities are projected to minimally affect the analysis area's demography. Baseline patterns and distributions of these factors, as described in Chapter 4.1.1.20.2.1 of the 2012-2017 WPA/CPA Multisale EIS, are not expected to change for the analysis area as a whole. Lafourche Parish (EIA LA-3), including Port Fourchon, and Lafayette Parish (EIA LA-2) in Louisiana are projected to experience noteworthy impacts to population as a result of an increase in demand for OCS labor from the OCS Program. The WPA proposed action is projected to have an incremental contribution of less than 1 percent to the population level in any of the EIA's, in comparison to other factors influencing population growth, such as the status of the overall economy, fluctuations in workforce, net migration, and changes in income. Given both the low levels of population growth and industrial expansion associated with the WPA proposed action, it is expected that the baseline age and racial distribution pattern will continue through the analysis period.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

BOEM conducted a search of Internet resources and also known data sources related to demographics. The primary source of new information related to demographics is Woods & Poole Economics, Inc. (2011), which is an annual update to the data that were used in the 2012-2017 WPA/CPA Multisale EIS. Woods & Poole Economics, Inc. (2011) provides projections of economic and demographic variables at the county level. **Table 4-6** provides projections of the evolution of the total population in all EIA's in future years, while **Table 4-7** provides projections of the evolution of total employment in the same areas. These projections assume the continuation of existing social, economic, and technological trends at the time of the forecast. In 2011, the total Gulf Coast population was 24.85 million. In 2011, the EIA's with the largest populations were TX-3 (6.32 million), FL-4 (6.26 million), and FL-3 (3.69 million). The EIA's with the smallest populations were LA-1 (349,090), MS-1 (484,980), and LA-2 (591,720). For all EIA's combined, it is expected that the total population will grow at a 1.2 percent rate between 2011 and 2051. The fastest population growth is expected in TX-3 (1.5%) and TX-1 (1.5%); the slowest population growth is expected in LA-4 (0.5%) and MS-1 (0.6%). **Tables 4-8 through 4-20** provide projections of employment, income, wealth, business patterns, and racial composition for individual EIA's. In general, the projections of these variables have not changed noticeably from the projections in the 2012-2017 WPA/CPA Multisale EIS.

As discussed in **Chapter 4.1.1.20.3**, BOEM has incorporated a new version of MAG-PLAN into its decisionmaking process. The MAG-PLAN is an input-output model that BOEM uses to estimate the employment and economic demand generated by OCS lease sales and to allocate this demand to onshore EIA's along the Gulf Coast. **Table 4-21** presents the expected impacts to population from the WPA proposed action based on MAG-PLAN's employment estimates, while **Table 4-22** presents the expected impacts to population for the cumulative scenario. The changes in these estimates correspond closely to the changes in the employment estimates discussed in **Chapter 4.1.1.20.3**. However, the changes to these estimates from the 2012-2017 WPA/CPA Multisale are modest and thus do not change the associated impact conclusions.

Summary and Conclusion

BOEM has reexamined the analysis for demographics presented in the 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 demographics presented in the 2012-2017 WPA/CPA Multisale EIS. This is because the updated MAG-PLAN output still suggests that the impacts of the WPA proposed action on demographics would be relatively small. In addition, the new Woods & Poole Economics, Inc.'s data were roughly in line with prior expectations. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.20.3. Economic Factors

BOEM has reexamined the analysis for economic factors presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for economic factors presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of economic factors can be found in Chapter 4.1.1.20.3.1 of the 2012-2017 WPA/CPA Multisale EIS.

The WPA proposed action would have economic impacts on a variety of firms along the OCS industry's supply chain. For example, the WPA proposed action would directly affect firms that are responsible for well drilling, equipment manufacturing, pipeline construction, and servicing OCS activities. The OCS activities would also impact the suppliers to those firms, as well as firms that depend on consumer spending of oil and gas industry workers. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on economic factors can be found in Chapter 4.1.1.20.3.2 of the 2012-2017 WPA/CPA Multisale EIS.

Should the WPA proposed action occur, there would be only minor economic changes in the Texas, Louisiana, Mississippi, Alabama, and Florida EIA's. This is because the demand would be met primarily with the existing population and labor force. Most of the employment related to the WPA proposed action is expected to occur in Texas (primarily in the EIA TX-3) and in the coastal areas of Louisiana. The WPA proposed action, irrespective of whether one analyzes the high-case or low-case production scenario, would not cause employment effects >0.1 percent in any EIA along the Gulf Coast.

An oil spill can have a number of effects on local economies. The most direct effects are felt in industries that depend on resources that are damaged or rendered unusable for a period of time due to a spill. For example, beach recreation, recreational fishing, and commercial fishing would be vulnerable if beach or fish resources were damaged due to an oil spill. However, for small to medium oil spills, the impacts to these activities would likely be localized and small in scale. An oil spill could also have noticeable economic impacts if it were to impact important transportation routes or affect the operations of certain port facilities. However, the likelihood of a single oil spill shutting down an entire waterway or port facility is quite low. The other economic effects of an oil spill are primarily determined by indirect actions or events that occur along with an oil spill. A detailed impact analysis of the accidental impacts that may be associated with proposed WPA Lease Sale 233 on economic factors can be found in Chapters 4.1.1.20.3.3 of the 2012-2017 WPA/CPA Multisale EIS.

An oil spill can cause a number of disruptions to local economies. A number of these effects are due to industries that depend on damaged resources. However, the impacts of an oil spill can be somewhat broader if firms further along industry supply chains are affected. These effects depend on issues such as the effects of cleanup operations and the responses of policymakers to a spill. However, the impacts of small-to medium-sized spills should be localized and temporary. A catastrophic spill along the lines of the one resulting from the *Deepwater Horizon* explosion would have more noticeable impacts to the economy. However, the likelihood of another spill of this scale is low.

The WPA proposed action would contribute to the economic effects of the broader OCS Program. The OCS Program directly affects firms that are responsible for well drilling, equipment manufacturing, pipeline construction, and servicing OCS activities. The OCS activities also impact the suppliers to those firms, as well as firms that depend on consumer spending of oil and gas industry workers. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on economic factors can be found in Chapter 4.1.1.20.3.4 of the 2012-2017 WPA/CPA Multisale EIS.

The cumulative impacts of the WPA proposed action would be determined by the expected path of the economy and by the expected progression of the OCS industry in upcoming years. The expected path of the overall economy is projected using the data provided by Woods & Poole Economics, Inc. (2010). The expected economic impacts of the OCS industry in upcoming years are estimated using the mathematical model MAG-PLAN. The cumulative impacts of the WPA proposed action to the economies along the Gulf Coast are expected to be relatively small.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

BOEM conducted a search of Internet resources and also known data sources related to economic factors. The primary new information source that has become available is a revised version of MAG-PLAN. The MAG-PLAN is an input-output model that BOEM uses to estimate the employment and economic demand generated by OCS lease sales and to allocate this demand to onshore EIA's along the Gulf Coast. The updated version of MAG-PLAN incorporates an improved method for estimating the economic impacts of the spending of workers in the OCS industry. BOEM has also incorporated a methodology in which the employment impacts of lease sales are distributed to onshore areas more similarly for WPA and CPA lease sales. BOEM is continuing to review methods for distributing the impacts of lease sales among EIA's and for differentiating the impacts of WPA and CPA lease sales.

Tables 4-23 through 4-25 present the revised MAG-PLAN estimates of the employment impacts of the WPA proposed action, while **Tables 4-26 through 4-28** present the revised estimates of the cumulative impacts of all OCS activities. As shown in **Table 4-25**, the estimated peak employment impacts of the WPA proposed action will primarily occur in the following EIA's (the number of jobs in the low and high scenarios, respectively, are presented in parenthesis): TX-3 (1,225; 2028); LA-3 (333; 561); LA-2 (249; 410); and TX-1 (212; 419). These updated employment estimates reflect a modest decrease from the estimates of the 2012-2017 WPA/CPA Multisale EIS for Texas EIA's and a modest increase for Louisiana EIA's. These updated estimates also bring BOEM's results more in line with the findings of Quest Offshore (2011), which incorporates proprietary OCS supply chain data into its input-output model to create various measures of the economic impacts of the Gulf OCS Program.

Recent information shows that permitting and exploration activities in the Gulf increased in pace in 2012 (compared with 2010 and 2011). Eighty-nine deepwater permits were issued in 2012 (by October 2012); this compares with 76 permits in 2009, 32 permits in 2010, and 38 permits in 2011 (Klimasinska, 2012). As of December 2012, 16 of 18 drillships and 17 of 31 semisubmersibles were actively drilling in the Gulf (Rigzone, 2012). IHS Petrodata's Jackup Day Rate Index for the Gulf of Mexico increased from 296 in November 2011 to 388 in November 2012, while jackup utilization increased from 52 percent to 63 percent over the same time period (IHS.com, 2012). Other anecdotal evidence suggests that Gulf exploration and development activity picked up noticeably in 2012 (Greenberg, 2012).

Information regarding the number of blocks leased and the bids received in previous lease sales is presented in "Outer Continental Shelf Lease Sale Statistics" (USDOI, BOEM, 2012d). A discussion of the procedures that BOEM uses to ensure that the Federal Government receives proper returns from lease sales can be found in "Summary of Procedures for Determining Bid Adequacy at Offshore Oil and Gas Lease Sales: Effective July 1999, with Sale 174" (USDOI, MMS, 1999). Agalliu (2011) presents a comparative analysis of the GOM's fiscal system relative to fiscal systems in other countries. This study creates a composite measure of government return and shows that the fiscal systems for the shelf and deepwater areas of the Gulf of Mexico rank favorably relative to fiscal systems in other countries. An economic analysis of the costs and benefits of leasing in the Gulf of Mexico is presented in Section 2.12 of the 2012-2017 Programmatic EIS (USDOI, BOEM, 2012c). This analysis found that the benefits of leasing in both the WPA and CPA continued to exceed the costs. More information regarding BOEM's economic analyses can be found in the economic analysis methodology for the Five-Year Program (USDOI, BOEM, 2012e).

Incomplete or unavailable information, identified in this section and in the 2012-2017 WPA/CPA Multisale EIS, related to economics may be relevant to reasonably foreseeable adverse impacts on these resources. With regard to the *Deepwater Horizon* explosion, oil spill, and cleanup, BOEM has determined that the incomplete or unavailable information would not be essential to a reasoned choice among alternatives for the reasons stated in the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

BOEM has reexamined the analysis for economic factors presented in the 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 economic factors presented in the 2012-2017 WPA/CPA Multisale EIS. This is because the updated MAG-PLAN output still suggests that the impacts of the WPA proposed action on employment would be relatively small. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.1.20.4. Environmental Justice

BOEM has reexamined the analysis for environmental justice presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for environmental justice presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

The full analyses of the potential impacts of routine activities and accidental events associated with the WPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of environmental justice can be found in Chapter 4.1.1.20.4.1 of the 2012-2017 WPA/CPA Multisale EIS.

Impact-producing factors that may result from routine events associated with the WPA proposed action that could affect environmental justice include the following: (1) potential infrastructure changes/expansions including fabrication yards, support bases, and onshore disposal sites for offshore waste; (2) increased commuter and truck traffic; and (3) employment changes and immigration. A detailed impact analysis of the routine impacts of OCS activities associated with proposed WPA Lease Sale 233 on environmental justice can be found in Chapter 4.1.1.20.4.2 of the 2012-2017 WPA/CPA Multisale EIS.

Because of the existing extensive and widespread support system for OCS-related industry and associated labor force, the effects of routine events related to the WPA proposed action are expected to be widely distributed and to have little impact. Where such change might occur is impossible to predict but, in any case, it would be very limited. Impacts related to the WPA proposed action on minority and low-income populations are expected to be primarily economic in nature and to have a limited but positive effect on low-income and minority populations because the WPA proposed action would contribute to the sustainability of current industry and related support services. The OCS-related infrastructure is widely distributed within the impact area, and concentrations of minority and low-income populations are not adjacent to or associated with this infrastructure (Chapter 4.1.1.20.4.1 of the 2012-2017 WPA/CPA Multisale EIS). Therefore, the WPA proposed action is not expected to have a disproportionate effect on these populations within the WPA.

Impact-producing factors associated with accidents as a result of the WPA proposed action that could affect environmental justice include oil spills, vessel collisions, and chemical/drilling-fluid spills. These factors could affect environmental justice through (1) direct exposure to oil, dispersants, degreasers, and other chemicals that can affect human health; (2) decreased access to natural resources due to environmental damages, fisheries closures, or wildlife contamination; and (3) proximity to onshore disposal sites used in support of oil and chemical spill cleanup efforts. A detailed impact analysis of the accidental impacts that may be associated OCS activities associated with proposed WPA Lease Sale 233

on environmental justice can be found in Chapter 4.1.1.20.4.3 of the 2012-2017 WPA/CPA Multisale EIS.

Chemical and drilling-fluid spills may be associated with exploration, production, or transportation activities that result from the WPA proposed action. Low-income and minority populations might be more sensitive to oil spills in coastal waters than is the general population because of their dietary reliance on wild coastal resources, their reliance on these resources for other subsistence purposes such as sharing and bartering, their limited flexibility in substituting wild resources with purchased ones, and their 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. BOEM's subject-matter experts have utilized available, credible information for this analysis. Although most criteria related to environmental justice may not be essential to a reasoned choice among alternatives, subsistence impacts may be essential. Nevertheless, subsistence research is pending and outcomes will not be available before publication of this Supplemental EIS. What credible information is available was applied using accepted methodologies. BOEM will continue to seek additional information as it becomes available and bases this analysis on the best information currently available. With the exception of a catastrophic accidental event, such as the *Deepwater Horizon* explosion, the impacts of oil spills, vessel collisions, and chemical/drilling fluid spills are not likely to be of sufficient duration to have adverse and disproportionate long-term effects for low-income and minority communities in the analysis area.

An event like the *Deepwater Horizon* explosion, oil spill, and cleanup could have adverse and disproportionate effects for low-income and minority populations in the analysis area. To date, there is little concrete evidence that such effects may have occurred (Brown et al., 2011; Dickey, 2012; King and Gibbons, 2011; Middlebrook et al., 2011; U.S. Dept. of Labor, OSHA, 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). Whether or not long-term impacts to low-income and minority populations will occur is unknown. While economic impacts were partially mitigated by employers retaining employees for delayed maintenance or through the Gulf Coast Claims Facility Program's emergency funds, the physical and mental health effects to both children and adults within these populations could potentially unfold for many years. 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). Likewise, some low-income and/or minority groups may be more reliant on natural resources and/or less equipped to substitute contaminated or inaccessible natural resources with private market offerings. 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. The post-*Deepwater Horizon*'s human environment remains dynamic, and BOEM will continue to monitor these populations over time and to document short- and long-term impacts. The long-term impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup will become clearer as time allows the production of peer-reviewed research and targeted studies that determine those impacts.

The *Deepwater Horizon* explosion and oil spill was a low-probability catastrophic event. The kinds of accidental events (smaller, shorter time scale) that are likely to result from the WPA proposed action may affect low-income and/or minority populations more than the general population, at least in the shorter term. These higher risk groups may lack financial or social resources and may be more sensitive and less equipped to cope with the disruption these events pose. These smaller events, however, are not likely to significantly affect minority and low-income populations in the long term.

Of all activities in the cumulative scenario, those that could potentially impact environmental justice in the WPA include (1) the WPA proposed action and the OCS Program, (2) State oil and gas activity, (3) existing infrastructure associated with petrochemical processing including refineries and polyvinyl facilities, (4) existing waste facilities including landfills, (5) coastal erosion/subsidence, (6) hurricanes, and (7) the lingering impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup. 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. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed WPA Lease Sale 233 on environmental justice can be found in Chapter 4.1.1.20.4.4 of the 2012-2017 WPA/CPA Multisale EIS.

The onshore support system for OCS activities is extensive and widespread across the impact area. The labor force associated with OCS activities is also extensive and widespread across the impact area. Therefore, in the cumulative case, effects are also expected to be widely distributed and, except in the case of Louisiana, virtually nondetectable. In general, the cumulative effects of the OCS Program are expected to be economic and to have a limited but positive effect on low-income and minority populations. In Louisiana, these positive economic effects are expected to be greater. In general, who will be hired and where new infrastructure might be located is impossible to predict. As stated above, OCS-related infrastructure is widely distributed within the impact area, and concentrations of minority and low-income populations are not adjacent to or associated with this infrastructure. Therefore, the cumulative OCS Program will not have a disproportionate effect on these populations. Lafourche Parish will experience the most concentrated effects of cumulative impacts. These groups are not expected to be differentially affected because the parish is not heavily low income or minority and because the effects of road traffic and port expansion would not occur in areas of low-income or minority concentration.

The WPA proposed action is not expected to have disproportionate high/adverse environmental or health effects on minority or low-income people. In the Gulf of Mexico coastal area, the contribution of the WPA proposed action and the OCS Program for cumulative effects of all activities and trends affecting environmental justice issues over the next 40 years is expected to be negligible to minor. The cumulative effects will be concentrated in coastal areas and along waterways like Houston's Ship Canal. Most OCS Program effects are expected to be in the areas of job creation and the stimulation of the economy, and they are expected to make a positive contribution to environmental justice. 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 WPA proposed action to the cumulative impacts would also be minor. State offshore leasing programs in Alabama and Louisiana have similar, although more limited, effects due to their smaller scale. Cumulative effects from onshore infrastructure, including waste facilities, is 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. Coastal landloss/subsidence, hurricanes, and global warming all raise environmental justice issues, as do the lingering effects of the *Deepwater Horizon* explosion, oil spill, and cleanup. The cumulative consequences to environmental justice cannot be determined at this time. Nevertheless, a single OCS lease sale added to existing State and Federal leasing programs and the associated onshore infrastructure will make only minor contributions to these cumulative effects. Refer to Chapter 4.1.1.20.4.4 of the 2012-2017 WPA/CPA Multisale EIS for the complete cumulative analysis.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Additional research was conducted to investigate the availability of recent information affecting environmental justice since publication of the 2012-2017 WPA/CPA Multisale EIS. Various sources were examined, including the websites of numerous Federal and State agencies, including the following: 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; Texas Commission on Environmental Quality; Louisiana Recovery Authority; and Louisiana Office of Community Development. 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*, and *The Energy Journal*. With regard to oil-spill claims related to the *Deepwater Horizon* explosion, oil spill, and cleanup, the Gulf Coast Claims Facility Transition Process is closed and the Court Supervised Settlement Program has been in operation since June 4, 2012 (Gulf Coast Claims Facility, 2012). An Economic and Property Damages Settlement was reached in early 2012 and includes the following types of claims: seafood compensation; business economic loss; individual economic loss; loss of subsistence; vessel physical damage; Vessel-of-Opportunity charter payment; coastal real property damage; wetlands real property damage; and real property sales loss. A Medical Benefits Settlement was also reached in early 2012 and offers benefits to qualifying people who resided in the United States as of April 16, 2012, who were either "Clean-Up Workers" or who were residents in certain defined beachfront areas and wetlands ("Zones") during certain time periods in 2010.

On May 2, 2012, the Court granted preliminary approval for the settlement and ordered that the Court-supervised settlement program begin accepting claims on June 4, 2012. For economic and property damages, valid claims will be paid as they are approved. For medical claims, payments and other benefits will be distributed after the final approval of the settlement and any appeals are resolved. The new official court-authorized claims administration website is located at http://www.deepwaterhorizoneconomicsettlement.com. Persons who filed a claim with the Gulf Coast Claims Facility for losses, such as subsistence, whose claims were rejected or who have not already accepted a final settlement from British Petroleum (BP), may file a new claim with the *Deepwater Horizon* Claims Center (*Deepwater Horizon* Claims Center, 2012). The National Institute of Environmental Health Sciences announced in November 2012 that over 29,000 cleanup workers and volunteers were enrolled in the Gulf Long-Term Follow-Up (GuLF) STUDY, which is a national effort to determine if the Gulf oil spill led to physical or mental health problems. Enrollment was extended through March 1, 2013, to reach the National Institutes of Environmental Health Sciences' target goal of 55,000 participants (National Institutes of Environmental Health Sciences, 2012; Mackar, 2012; National Institutes of Health, 2013).

Information regarding the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup remains incomplete. Studies regarding environmental justice concerns in light of the *Deepwater Horizon* explosion, oil spill, and cleanup are still ongoing, and it may be years before data are available and certainly not within the timeframe contemplated by this NEPA analysis. The NRDA process, which is ongoing, may help to inform issues relating to subsistence and other indigenous reliance on natural resources. However, information related to NRDA is unavailable and unobtainable at this time, regardless of costs. In its place, BOEM's subject-matter experts have used credible information that is available and applied it using accepted socioeconomic methodologies. Although most criteria related to environmental justice may not be essential to a reasoned choice among alternatives, health impacts may be essential. Nevertheless, long-term health studies are pending and may not be available for use for several years or longer. What credible information is available was applied using accepted methodologies. BOEM will continue to seek additional information as it becomes available and bases the previous analysis on the best information currently available.

Summary and Conclusion

BOEM has reexamined the analysis for environmental justice presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented above. BOEM has determined that the additional information does not alter the impact conclusion for environmental justice because the information is currently inconclusive with regard to environmental justice issues and will remain so for an indefinite period of time. Therefore, the analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed Lease Sale 233.

4.1.1.21. 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 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

Species considered due to FWS concerns can be found in Chapter 4.1.1.21 of the 2012-2017 WPA/CPA Multisale EIS. A detailed explanation of the routine and accidental impact-producing factors can be found in Chapters 3.1 and 3.2 of the 2012-2017 WPA/CPA Multisale EIS, respectively. The cumulative analysis in the 2012-2017 WPA/CPA Multisale EIS considers the effects of impact-producing factors related to past WPA lease sales, proposed WPA Lease Sale 233, and reasonably foreseeable lease sale programs in the WPA. Cumulative impacts attributed to OCS activity co-occur with State oil and gas activities, other governmental and private projects and activities, and pertinent natural processes and events that may occur that adversely affect wetlands. As a result of these activities and processes, several impact-producing factors discussed in Chapter 3.3 of the 2012-2017 WPA/CPA Multisale EIS would

contribute to impacts on species considered due to FWS concerns and associated habitat during the life of proposed WPA Lease Sale 233.

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 WPA 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. Lethal effects could occur from ingestion of accidentally released plastic materials from OCS 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 WPA proposed action. Accidental blowouts, oil spills, and spill-response activities resulting from the WPA proposed action have the potential to impact small to large areas in the Gulf of Mexico, 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 WPA proposed action would not be likely to result in a significant incremental impact on the mammal and plant species within the WPA; in comparison, non-OCS-related activities, such as habitat loss and competition, have historically proved to be of greater threat to the species of concern.

The WPA proposed action would be expected to have little or no effect on the species of concern. The conclusions for the following species can be found in their respective chapters: West Indian manatee (**Chapter 4.1.1.11** of this Supplemental EIS and Chapter 4.1.1.11 of the 2012-2017 WPA/CPA Multisale EIS); green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles (**Chapter 4.1.1.12** of this Supplemental EIS and Chapter 4.1.1.12 of the 2012-2017 WPA/CPA Multisale EIS); and Attwater's greater prairie-chicken, northern, piping plover, whooping crane, and mountain plover (**Chapter 4.1.1.14** of this Supplemental EIS and Chapter 4.1.1.14 of the 2012-2017 WPA/CPA Multisale EIS).

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Various Internet sources were examined and literature searches conducted in order to assess recent information regarding these species that may be pertinent to the WPA. BOEM has only focused on species within coastal counties because those are the species that could be potentially impacted by oil and gas development activities, including a potential OCS spill. No new information was discovered.

Given that the boundary of the WPA is more than 300 mi (483 km) from the *Macondo* well and that the westernmost extent of the plume and sheen did not reach the WPA, it appears that the above mammal and plant species would not have been directly impacted by the *Deepwater Horizon* explosion, oil spill, and cleanup. 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 cleanup will be available. Relevant data on the status of populations after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion 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 based upon 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 (including the No Action and Action alternatives) for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

BOEM has reexamined the analysis for species considered due to FWS concerns presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. No new significant information was discovered that would alter the impact conclusion for species considered due to FWS concerns presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed WPA Lease Sale 233.

4.1.2. Alternative B—The Proposed Action Excluding 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 and Figure 2-1** of this Supplemental EIS and Chapter 2.3.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS). All of the assumptions (including the three 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**.

Effects of the Alternative

The following analyses are based on the scenario for the WPA proposed action (Alternative A). The scenario provides assumptions and estimates on the amounts, locations, and timing for OCS 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 WPA Lease Sale 233. 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.

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 those under the WPA proposed action (**Chapter 4.1.1**) for the following resources:

- Air Quality
- Water Quality
- Coastal Barrier Beaches and Associated Dunes
- Wetlands
- Seagrass Communities
- *Sargassum* Communities
- Chemosynthetic and Nonchemosynthetic Deepwater Benthic Communities
- Soft Bottom Benthic Communities
- Marine Mammals
- Sea Turtles
- Diamondback Terrapins
- Coastal and Marine Birds
- Fish Resources and Essential Fish Habitat
- Commercial Fisheries
- Recreational Fishing
- Recreational Resources
- Archaeological Resources
- Human Resources and Land Use

The impacts to some Gulf of Mexico resources under Alternative B would be slightly different from the impacts expected under the WPA proposed action. These impacts are described below.

Impacts on Topographic Features

The sources and severity of impacts associated with this alternative are those sale-related activities discussed for the WPA proposed action. The potential impact-producing factors to the topographic features of the WPA are anchoring and structure emplacement, drilling-effluent and produced-water discharges, blowouts, oil spills, and structure removal. A more detailed discussion of these potential impact-producing factors and the appropriate mitigating measures is presented in **Chapter 2.3.1.3.1** of this Supplemental EIS and in Chapter 2.3.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS.

Impacts of Routine and Accidental Events

All 21 topographic features of the WPA are located within water depths less than 200 m (656 ft). These features occupy a very small portion of the entire area. Of the potential impact-producing factors that may affect the topographic features, anchoring, structure emplacement, and structure removal would be eliminated by the adoption of this alternative. Effluent discharge and blowouts would not be a threat to the topographic features 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 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 in Chapter 3.2.1 of the 2012-2017 WPA/CPA Multisale 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 GOM oil. An exception to this could occur if oil is released at the seafloor under high pressure, having the effect of atomizing the oil into micro-droplets that have very little buoyancy. Under these conditions, a subsea oil plume could form and travel laterally with the prevailing currents. 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). The fact that the topographic features are widely dispersed in the WPA, 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 this lease sale would further distance potential spills from the habitat. Chapter 4.1.1.6.3 of the 2012-2017 WPA/CPA Multisale EIS discusses the risk of spills interacting with topographic features, especially the Flower Garden Banks, 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, 1992a 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, diseases) and may hamper their ability to reproduce. A complete recovery of such an affected area could take in excess of 10 years.

Cumulative Impacts

With the exception of the topographic features, the cumulative impacts of Alternative B on the environmental and socioeconomic resources of the WPA would be identical to Alternative A. The incremental contribution of the WPA 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 oil and gas 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 activities, which otherwise would be conducted within the blocks according to lease stipulations. 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; recovery from such an event is anticipated to occur within a period of 10 years.

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 proposed WPA Lease Sale 233. If this alternative is chosen, the opportunity for development of the estimated 0.116-0.200 BBO and 0.538-0.938 Tcf of gas that could

have resulted from the proposed lease sale would be precluded postponed to a future WPA lease sale. The No Action alternative encompasses the same potential impacts as a decision to delay the proposed lease sale to a later scheduled lease sale under the Five-Year Program, when another decision on whether to hold that future lease sale is made. As the potential impacts are the same, namely that most impacts related to Alternative A would not occur as described below, delay of the proposed lease sale was not considered as a separate alternative from Alternative C. Any potential environmental impacts resulting from proposed WPA Lease Sale 233 would not occur or would be postponed to a future lease sale decision.

Effects of the Alternative

This Agency published a report that examined previous exploration and development activity scenarios (USDOI, MMS, 2007a). This Agency 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 activity, and any single lease sale accounts for only a small percentage of the total OCS activities. In 2006, leases from 92 different lease sales contributed to Gulf of Mexico production, while an average WPA lease sale contributed to 3 percent of oil production and 3 percent of gas production in the WPA. In 2006, leases from 15 different lease sales contributed to the installation of production structures in the Gulf of Mexico, while an average WPA lease sale contributed to 6 percent of the installation of production structures in the WPA. In 2006, leases from 70 different lease sales contributed to wells drilled in the Gulf of Mexico, while an average WPA lease sale contributed to 6 percent of the wells drilled in the WPA.

As in the past, the WPA proposed lease sale would contribute to maintaining the present level of OCS activity in the Gulf of Mexico. Exploration and development activity, including service-vessel trips, helicopter trips, and construction, that would result from the WPA proposed lease sale would replace activity resulting from existing leases that have reached, or are near the end of, their economic life.

Environmental Impacts

If proposed WPA Lease Sale 233 were cancelled, the resulting development of oil and gas would most likely be postponed to a future sale; therefore, the overall level of OCS activity in the WPA would only be reduced by a small percentage, if any. Therefore, the cancellation of proposed WPA Lease Sale 233 would not significantly change the environmental impacts of overall OCS activity in the long term. The environmental impacts expected to result from the WPA proposed action, which are described above, would not occur in the short term, but they would likely be postponed to any future lease sale decision.

Economic Impacts

Although environmental impacts may be reduced or postponed by cancelling a lease sale, the economic impacts of cancelling a scheduled lease sale should be given consideration. **Chapter 4.1.1.20.3** of this Supplemental EIS and Chapter 4.1.1.20.3.2 of the 2012-2017 Multisale EIS discuss the potential economic impacts of the WPA proposed action. In the event that proposed WPA Lease Sale 233 is cancelled or postponed, there may be impacts to employment along the Gulf Coast, but these are not expected to be significant (e.g., less than 1% of total employment) or long term given the existing OCS infrastructure.

Federal, State, and local governments would have to forgo the revenue that would have been received from proposed WPA Lease Sale 233. There could be minor impacts on global energy prices from cancelling the proposed WPA 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 proposed WPA Lease Sale 233. For example, the longer-term economic impacts of cancelling the WPA 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/parishes in Texas and Louisiana for which the OCS industry as a whole is an important component of their economies.

From a programmatic perspective, cancellation of a Five-Year Program of lease sales in the Gulf of Mexico would have much greater effects in terms of economic impacts, energy strategy, and environmental impacts. For a more detailed discussion of the effects of the cancellation of a Five-Year Program of lease sales in the Gulf of Mexico, refer to Appendix G.1 of the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

Canceling a lease sale would eliminate the effects described for Alternative A (**Chapter 4.1.1**). Other sources of energy would substitute for the lost production. Principal substitutes would be additional imports, conservation, additional domestic production, and switching to other fuels. These alternatives, except conservation, have significant negative environmental impacts of their own. For example, tankering of fuels from alternate sources over longer distances would also have significant potential negative impacts, including through the increased risk of spills.

4.2. PROPOSED CENTRAL PLANNING AREA LEASE SALE 231

Proposed CPA Lease Sale 231 is tentatively scheduled to be held in early 2014. 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 of the 2012-2017 WPA/CPA Multisale EIS). As of March 2013, approximately 43.0 million ac of the proposed CPA lease sale area are currently unleased. 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.

Alternative A (The Proposed Action) of the 2012-2017 WPA/CPA Multisale EIS also included an exclusion of whole and partial blocks that lie within the 1.4-nmi buffer zone north of the maritime boundary between the United States and Mexico. The U.S. and Mexico have been pursuing an Agreement to govern the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico. On February 20, 2012, the Agreement was signed by representatives of each Government, but it has not yet entered into force. Upon its entry into force, the blocks and acreage in this buffer zone that were not offered in past lease sales will become available for leasing. As the Agreement may enter into force prior to the tentative date scheduled to hold proposed CPA Lease Sale 231, BOEM has considered this 1.4-nmi buffer area as being potentially available for lease under Alternative A. There are no known features of the buffer zone that would distinguish these blocks from those adjacent blocks that were considered in the 2012-2017 WPA/CPA Multisale EIS (e.g., no known topographic features, no identified critical habitat) or that would alter the conclusions on impacts that may be expected to result if the proposed action is chosen. However, all resources in the buffer area would be considered in postlease activities and plan approval reviews. Further, there are no known features in this area that would suggest resources would react to potential impact-producing factors differently than those areas and resources already identified.

Although the leasing of portions of the CPA and WPA (subareas or blocks) can be deferred during a Five-Year Program, DOI is conservative throughout the NEPA process and includes the total area within the Gulf of Mexico planning areas for analysis.

Chapter 4.2.1 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, and it presents analyses of the potential impacts of routine events, accidental events, and cumulative activities on these resources. Baseline data are considered in the assessment of impacts from proposed CPA Lease Sale 231 on these resources. 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.

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 analyses of impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup on the physical, biological, and socioeconomic resources below are based on post-*Deepwater Horizon* credible scientific information that was publicly available at the time this document was prepared and were applied using accepted methodologies. BOEM will continue to monitor these resources for effects caused by the *Deepwater Horizon* explosion, oil spill, and cleanup.

Chapter 3.2.1 provides a brief summary of the information on accidental spills that could result from all operations conducted under the OCS Program, as well as information on the number and sizes of spills from non-OCS sources. The number of spills ≥1,000 bbl and <1,000 bbl estimated to occur as a result of the CPA proposed action is provided in Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS. The mean number of spills ≥1,000 bbl estimated for the CPA proposed action is <1 spill. Spill rates for several spill-size categories are provided in Table 3-12 of the 2012-2017 WPA/CPA Multisale EIS. The probabilities of a spill ≥1,000 bbl occurring and contacting modeled environmental resources are described in Chapter 3.2.1.8 and Figures 3-8 through 3-28 of the 2012-2017 WPA/CPA Multisale EIS. For additional information on accidental spills that could result from all operations conducted under the OCS Program, as well as information on the number and sizes of spills from non-OCS sources, refer to Chapter 3.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

The potential impacts of a low-probability, catastrophic oil spill, such as the one that resulted from the *Deepwater Horizon* explosion, to the environmental and cultural resources and the socioeconomic conditions analyzed in the 2012-2017 WPA/CPA Multisale EIS are addressed in the "Catastrophic Spill Event Analysis" (Appendix B of the 2012-2017 WPA/CPA Multisale EIS). The reader is referred to Appendix B of the 2012-2017 WPA/CPA Multisale EIS for the analysis of potential effects of a catastrophic spill event for each resource. BOEM reviewed relevant information available since the 2012-2017 WPA/CPA Multisale EIS and summarized this information in the individual resource analyses below; however, BOEM's subject-matter experts determined that none of this newly available information significantly changed the analyses or conclusions regarding catastrophic events in Appendix B of the 2012-2017 WPA/CPA Multisale EIS. BOEM's analyses and conclusions of catastrophic events in Appendix B of the 2012-2017 WPA/CPA Multisale EIS remain unchanged and, therefore, BOEM refers the reader to Appendix B of the 2012-2017 WPA/CPA Multisale EIS for the analysis of the potential effects of a catastrophic event for each resource.

The cumulative analyses below consider impacts to physical, biological, and socioeconomic resources that may result from the incremental impact of proposed CPA Lease Sale 231 when added to all past, present, and reasonably foreseeable future human activities, including non-OCS activities, as well as all OCS activities (OCS Program). A summary of the environmental impacts of the cumulative case for the Gulf of Mexico resources are found in the individual resource analyses in **Chapters 4.1.1 and 4.2.1**. For additional information on the environmental impacts of the cumulative case for Gulf of Mexico resources, refer to Chapters 4.1.1 and 4.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

Non-OCS activities include, but are not limited to, import tankering; State oil and gas activity; recreational, commercial, and military vessel traffic; offshore liquefied natural gas activity; recreational and commercial fishing; onshore development; and natural processes. 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.

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 is very 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, CAA, CZMA, 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 EIS's, a variety of subsequent postlease NEPA reviews, and are also involved with ESA, 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, a set of assumptions and a scenario are developed, and impact-producing factors that could occur from routine oil and gas activities, as well as accidental events, are described. This information is summarized in **Chapter 3** of this Supplemental EIS and is discussed in detail in Chapter 3 of the 2012-2017 WPA/CPA Multisale EIS. Using this information, the multidisciplinary staff described above applies their knowledge and experience to conduct their analyses of the potential effects of proposed CPA Lease Sale 231.

The conclusions developed by the subject-matter experts regarding the potential effects of proposed CPA Lease Sale 231 for most resources are necessarily qualitative in nature; however, they are based on the expert opinion and judgment of highly trained subject-matter experts. This staff approaches this effort in good faith utilizing credible scientific information including, but not limited to, information available since the *Macondo* spill and applied using accepted methodologies. 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. This approach is described in the next subsection on "Incomplete or Unavailable Information."

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

BOEM has made conscientious efforts to comply 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, there are references to incomplete or unavailable information, particularly in relation to the *Deepwater Horizon* explosion and oil spill. The subject-matter experts for each resource used what scientifically credible information was publicly available at the time this Supplemental EIS was prepared. Where available, new information is summarized in **Chapter 4.2.1** 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. Where necessary, the subject-matter experts extrapolated from existing and new information published since the publication of the 2012-2017 WPA/CPA Multisale EIS. BOEM's subject-matter experts completed their analysis, using accepted methodologies, 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. There are no changes to the conclusions presented in the 2012-2017 WPA\CPA Multisale EIS.

As with the 2012-2017 WPA/CPA Multisale EIS, the most notable incomplete or unavailable information relates to the *Deepwater Horizon* explosion, oil spill, and cleanup in the CPA. Credible scientific data regarding the potential short-term and long-term impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup on both CPA or WPA resources is becoming available but remains incomplete at this time, and it could be many years before this information becomes available via the NRDA process, BOEM's Environmental Studies Program, and numerous studies by academia. Nonetheless, the subject-matter experts acquired and used newly available, scientifically credible information, determined that other additional information was not available absent exorbitant expenditures or could not be obtained regardless of cost in a timely manner, and where gaps remained, exercised their best professional judgment to extrapolate baseline conditions and impact analyses using accepted methodologies based on credible information.

It is important to note that, barring another catastrophic oil spill, which is a low-probability accidental event, the adverse impacts associated with the proposed CPA lease sale are small, even in light of the *Deepwater Horizon* explosion. This is because of BOEM's lease sale stipulations and mitigations, site-specific mitigations that become conditions of plan or permit approval at the postlease stage, and mitigations required by other State and Federal agencies.

For the following resources, as with the 2012-2017 WPA/CPA Multisale EIS, 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.

- Air Quality (**Chapter 4.2.1.1**)
- Water Quality (Coastal and Offshore) (**Chapters 4.2.1.2.1 and 4.2.1.2.2**, respectively)
- Coastal Barrier Beaches and Associated Dunes (**Chapter 4.2.1.3**)
- Wetlands (**Chapter 4.2.1.4**)
- *Sargassum* Communities (**Chapter 4.2.1.8**)
- Chemosynthetic and Nonchemosynthetic Deepwater Benthic Communities (**Chapters 4.2.1.9 and 4.2.1.10**, respectively)
- Soft Bottom Benthic Communities (**Chapter 4.2.1.11**)
- Alabama, Choctawhatchee, St. Andrew, and Perdido Key Beach Mice (**Chapter 4.2.1.15**)
- Commercial Fisheries (**Chapter 4.2.1.19)**
- Recreational Resources (**Chapter 4.2.1.21**)
- Archaeological Resources (Historic and Prehistoric) (**Chapters 4.2.1.22.1 and 4.2.1.22.2**, respectively)
- Land Use and Coastal Infrastructure (**Chapter 4.2.1.23.1**)
- Economic Factors (**Chapter 4.2.1.23.3**)

This chapter has thoroughly examined the existing credible scientific evidence that is relevant to evaluating the reasonably foreseeable significant adverse impacts of the CPA proposed lease sale 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. 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).

4.2.1. Alternative A—The Proposed Action

4.2.1.1. Air Quality

BOEM has reexamined the analysis for air quality presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for air quality presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

Further, a search was conducted for information published on air quality, and various Internet and publicly available sources were examined to determine any recent information regarding air quality. Sources investigated included, but were not limited to, journals and scientific articles, Google, Google Scholar, and several USEPA websites. All relevant new information is included below; however, no new significant information was discovered since publication of the 2012-2017 WPA/CPA Multisale EIS that would impact the conclusions herein.

As BOEM has previously noted in the 2012-2017 WPA/CPA Multisale EIS and despite the new information identified and provided below, there is incomplete or unavailable information regarding air quality and potential air impacts. Although final summary information and reports on air quality impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup may be forthcoming, USEPA, NOAA, and other agencies obtained and released to the public a large number of air quality measurements indicating that air impacts tended to be minor and below USEPA's health-based standards. As there are no continuing sources of air pollution related to the *Deepwater Horizon* explosion, oil spill, and cleanup, BOEM would not expect any additional measurements or information to alter the conclusions from currently existing data. In addition, as noted below and in **Appendix A**, 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. 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. As such, although there is incomplete or unavailable information on air quality impacts at this time that may be relevant to reasonably foreseeable adverse impacts, this information is not essential to a reasoned choice among alternatives. 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 presented in Chapter 4.2.1.1.1 of the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since that document was prepared. A brief summary of the potential impacts follows. The emissions of pollutants into the atmosphere from the routine activities associated with the CPA proposed action are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, emission heights, emission rates, and the distance of these emissions from the coastline. While regulations are in place to reduce the risk of impacts from 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. These emissions from routine activities and accidental events associated with the CPA proposed action are not expected to have concentrations that would change onshore air quality classifications.

The impacts of the OCS emissions on the onshore air quality are below BOEM's Significance Levels and the NAAQS. The USEPA commented that BOEM should compare model results to U.S. Environmental Protection Agency's SIL's. Therefore, the modeled results were compared with the U.S. Environmental Protection Agency's SIL's. The modeled concentrations for annual NO_x (0.4 $\mu g/m^3$) and 24-hour $PM_{2.5}$ (0.3 $\mu g/m^3$) in the Class I area exceeds the U.S. Environmental Protection Agency's SIL's for annual NO_x (0.1 $\mu g/m^3$) and 24-hour $PM_{2.5}$ (0.07 $\mu g/m^3$) in the Class I area.

Although the SIL's were exceeded, BOEM expects in practice, if the emissions were distributed more realistically across the CPA, that emissions would not exceed the SIL. 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 Mississippi Canyon Block 856.

Air Quality Modeling

There are many factors that BOEM evaluates to determine the potential impact occurring from offshore air emissions. These include estimates for likely emission sources, likely emission locations, emission rates, timeframes, and the likelihood of transport by wind 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 (**Chapters 4.1 and 4.2**). BOEM uses data gathered during recent OCS emission inventories, along with a scenario or estimates of future production, to evaluate the potential effects of emissions. The scenario provides (1) the set of assumptions for and estimates of future activities, (2) the rationale for the scenario assumptions and estimates, and (3) the type, frequency, and quantity of emissions from offshore sources associated with the CPA proposed action.

BOEM determined projected emissions resulting from the activities on the lease based on known emissions from various equipment, such as diesel engines and generators, and the level of offshore activity projected in the 2012-2017 WPA/CPA Multisale EIS. BOEM then uses a numerical model to calculate the concentration of five pollutants (NO_x, SO_x, $PM_{2.5}$, PM_{10}, and CO) at the receptor. Inputs to the model include the location of the emission source and the receptors, the aforementioned emissions, source parameters such as source height and source stack gas temperature, and a 5-year history of meteorological conditions. The latter two parameters influence the dispersion of the pollutant as it is carried from the source to the receptor. The model output is the concentration of the pollutant at the onshore receptor location at specified time intervals. A description of the numerical model, called the Offshore Coastal Dispersion (OCD) Model, and its results are summarized in **Appendix A**. One of the limitations of the OCD Model is that it is unable to directly model contributions to ambient ozone. To address this limitation, BOEM examined available studies on OCS oil and gas activities' contribution to onshore ozone levels, as described below and in **Appendix A**. These studies confirm that OCS oil and gas activities are likely to only have a minimal impact on onshore ozone.

The Comprehensive Air Quality Model with extensions (CAMx) was used to model contribution during an August 2000 ozone episode (Yarwood et al., 2004). The OCS contributions to ozone exceedances were minor. Yarwood et al. (2004) used a photochemical model to analyze the Year 2000 Gulfwide Emissions Inventory (GWEI) and selected the Houston-Galveston-Brazoria nonattainment area since it has the most severe ozone problem in the Gulf of Mexico region (System Applications International et al., 1995). One of the main relevant findings in Yarwood et al. (2004) is as follows: "The average impact of the Year 2000 GWEI emissions on 8-hour ozone levels above 85 ppb in Houston area is 0.2 ppb; although larger impacts may occur over the Gulf of Mexico." Haney et al. (2008) performed a modeling investigation using the Year 2000 and Year 2005 GWEI's in the WPA and CPA to evaluate the impact of offshore emissions on offshore and onshore ozone air quality, in which they proposed an emission-reduction scenario. They found a particular ozone episode where the onshore impact from all offshore oil-and-gas-related sources was small but generally larger than those estimates using the Year 2000 GWEI. They noticed higher simulated ozone concentrations from 2005 emissions due to increases in NO_x and VOC concentrations.

The OCD modeling was performed for the CPA Class I and Class II Areas, with the hypothetical CPA source located at Mississippi Canyon Block 856, which is approximately 56 mi (90 km) from shore. Meteorological data used were from the period 2000 through 2004. The surface data come from Patterson, Louisiana, and upper air data come from Slidell, Louisiana. Buoy data for Mississippi Canyon Block 856 come from Buoy 42040. These meteorological data points are the closest, physically, to the proposed lease sale area available to BOEM and, therefore the best approximation available. BOEM calculated scenario-specific emissions based on the *Year 2008 Gulfwide Emission Inventory Study* (Wilson et al., 2010) and Rigzone (2009). A spreadsheet was developed based on the findings of this study (Billings et al., official communication, 2012). To provide a conservative estimate, BOEM assumed a high-range of activity emissions during the year with the greatest amount of activity (e.g., drilling and platform and pipeline installation) out of the 40-year analysis period for the CPA proposed action. All of the scenario-predicted emissions were then modeled at one location in the CPA. Even with all the emissions being attributed to a single point (which would not be the case in reality and thus

provides a conservative estimate of impacts), the CPA emissions are projected to have minimal impacts to onshore air quality. The CPA emissions are within BOEM's maximum allowable increase for the scenario. Methodology, emissions, and modeling results are discussed further in **Appendix A**. As shown in **Appendix A**, emissions of pollutants into the atmosphere from the activities associated with the OCS Program are estimated to have minimal effects on onshore air quality because of the prevailing atmospheric conditions, emission rates and mixing heights, and the resulting pollutant concentrations. Given that these very conservative estimates of emissions were modeled and still below both agencies' regulatory thresholds, BOEM believes that the potential onshore impacts related to emissions from OCS oil and gas activities that may result from the CPA proposed action will not be significant.

BOEM is in the process of a comprehensive assessment of numerical methods (including variety of sensitivity analysis, comparison of emission inventories and evaluation of emission scenarios) using USEPA-approved models, which will help us to support our scientific statements in future EIS's. This modeling assessment will be helpful when considering that modern air quality models are still in development and need to be evaluated before they are widely used for realistic estimations of pollutant concentrations over offshore and coastal environments. However, this assessment will take time, potentially years, and there will always be some limitations in the application of models. For this reason, BOEM is using the OCD Model as it is appropriate for the offshore environment. BOEM's subject-matter experts also used their professional judgment in developing and modeling parameters to ensure that the results were conservative.

In response to the FY 2008 Consolidated Appropriations Act, USEPA issued 40 CFR 98, which requires reporting of greenhouse gas emissions. Subpart W of the Greenhouse Gas Reporting Rule requires petroleum and natural gas facilities that emit 25,000 metric tons or more of CO_2 equivalents per year to report emissions from equipment leaks and venting. On average, the amount of CO_2 emissions from a typical well site is about 237-439 tons per year. Subpart C of the Green House Gas Reporting Rule requires operators to report greenhouse gas emissions from general stationary fuel combustion sources to USEPA. At this point, this is just a reporting requirement; there are no specific NAAQS or emission limitations for greenhouse gases.

BOEM has included in **Appendix A** modeled estimates for certain greenhouse gases that may be directly emitted during OCS oil and gas activities. At this time, the greenhouse gas emissions related to OCS oil and gas activities are a very small percentage of national emissions, and it would be impossible to tease out the impacts from this small incremental addition from global climate change impacts attributable to all other global sources. As such, BOEM does not believe that the potential greenhouse gas emissions directly attributable to oil and gas activities on the OCS as a result of the CPA proposed action are significant to global greenhouse gas levels.

On the basis of OCD modeling for NO_x, SO_x, $PM_{2.5}$, PM_{10}, and CO, and the *Gulf of Mexico Air Quality Study* for O_3 (Science Applications International et al., 1995), BOEM is confident that offshore OCS oil and gas activities associated with the CPA proposed action will not contribute to exceedances of the NAAQS at the shoreline. The inference of conclusions from this study remains appropriate given both the decrease in the number of wells drilled and wells producing from wells in water depths <1,000 ft (305 m) and the industrial expansions into the deepwater Gulf of Mexico. During the past 5 years (2008-2012), the number of wells drilled in shallow water (<1,000-m [305-m] water depth) decreased by 45 percent from 468 wells in 2008 to 256 wells in 2012. The number of wells producing decreased by 23 percent from 5,648 to 4,355 wells during the same 5-year timeframe. Simultaneously, production expansion into deep water is documented in *Deepwater Gulf of Mexico 2006: America's Expanding Frontier* (USDOI, MMS, 2006) and in the biennial reports that preceded the 2006 version. According to the report, over the last 14 years, there has been an overall expansion in all phases of deepwater activity. There are approximately 8,221 existing leases in the Gulf of Mexico OCS, 54 percent of which are in deep water (USDOI, MMS, 2006). (Note that lease status may change daily; therefore, the current number of existing leases is an approximation.) Contrast this to the approximately 5,600 existing Gulf of Mexico leases in 1992, only 27 percent of which were in deep water. On average, there were 30 rigs drilling in deep water in 2005, compared with only 3 rigs in 1992. Likewise, deepwater oil production rose over 840 percent and deepwater gas production increased about 1,600 percent from 1992 to 2002 (USDOI, MMS, 2006). This trend is observable in seismic activity, leasing, exploratory drilling, field discoveries, and production.

The quantity of air pollutants emitted is the direct result of the level of offshore activity. The concentrations of the emissions at the shoreline are influenced by the distance between the source of the

emissions and the receptors. With the simultaneous decrease in both the number of wells drilled and the number of wells producing in water depths <1,000 m (305 m) (shallow waters closest to shore) and the increase is leases, drilling, and production in water depths >1,000 m (305 m) (deeper waters farther from shore), it can be assumed that the emissions related to exploration and production activity have also moved farther offshore. As a result of these trends for fewer wells and wells that are farther offshore, the OCD modeling results obtained from Systems Applications International et al. in 1995, which demonstrate no NAAQS exceedances, remain conservative and are still applicable to the discussion of shoreline impacts from leases and associated activity projected to result from proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231. BOEM, however, supplemented this knowledge with additional data available since that time and by running the OCD model accompanying this Supplemental EIS. As shown in **Appendix A**, scenario-specific emissions of pollutants into the atmosphere from the routine activities associated with the CPA proposed action are projected to have minimal impacts to onshore air quality because of the prevailing atmospheric conditions, emission heights, emission rates, and the distance of these emissions from the coastline. Emissions from proposed-action activities as modeled in **Appendix A** will not contribute to any onshore exceedances of the NAAQS.

Impact Analysis

The following routine activities associated with the CPA proposed action would potentially affect air quality: 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. The impact analysis is based on four parameters—emission rates, surface winds, atmospheric stability, and the mixing height. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on air quality can be found in Chapter 4.2.1.1.2 of the 2012-2017 WPA/CPA Multisale EIS. Emissions of pollutants into the atmosphere from the activities associated with the 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, or natural gas or chemicals used offshore or pollutants 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 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. These response activities are temporary in nature and occur offshore; therefore, there are little expected impacts from these actions to onshore air quality. Accidents involving high concentrations of H_2S could result in deaths as well as environmental damage. Regulations and NTL's mandate safeguards and protective measures, which are in place, to protect workers from H_2S releases. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on air quality can be found in Chapter 4.2.1.1.3 of the 2012-2017 WPA/CPA Multisale EIS. 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.

Overall, since loss of well-control events, blowouts, and fires are rare events and are of short duration, potential impacts to air quality are not expected to be significant except in the rare case of a catastrophic event, and in such cases, are anticipated to be temporary. To date, air monitoring conducted following the *Deepwater Horizon* explosion, oil spill, and cleanup has not found any pollutants at levels expected to cause long-term harm (USEPA, 2010), and this is addressed in Chapter 4.2.1.23.4 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS.

The activities in the cumulative scenario that could potentially impact onshore air quality considered here are the CPA proposed action, the OCS Program, State oil and gas programs, other major factors influencing offshore environments, onshore non-OCS activities, accidental releases from oil spills,

accidental releases of H_2S, natural events (e.g., hurricanes), and a catastrophic oil spill. Because the OCS Program includes both new drilling and production as well as production ending on older wells and platform removal, the level of impacts determined in earlier studies are assumed to adequately represent current conditions as well.

Emissions contributing to air quality degradation come from many sources. The NAAQS list is made up of the most common air pollutants, including ozone, particulate matter, NO_x, and SO_x. Air pollutants on the NAAQS are commonly referred to as criteria pollutants because they are ubiquitous. Although these pollutants can all occur naturally, elevated levels are the result of human activities.

Ozone pollution is mainly a daytime problem during the summer months. Strong sunlight and hot weather cause ground-level ozone to form in harmful concentrations in the air. Ozone is not emitted directly into the air. Ozone is a secondary pollutant formed in the presence of sunlight from the reaction of VOC's and NO_x. These pollutants are found in emissions from the following: vehicles such as automobiles, trucks, buses, aircraft, and locomotives; construction equipment; lawn and garden equipment; sources that combust fuel, such as large industries and utilities; small industries such as gas stations and print shops; and consumer products, including some paints and cleaners. In addition, biogenic, or natural emissions from trees and plants, are a major source of VOC's.

The concentration of ozone in the air is determined not only by the amounts of ozone precursor chemicals but also by weather and climate factors. Intense sunlight, warm temperatures, stagnant high-pressure weather systems, and low wind speeds cause ozone to accumulate in harmful amounts. Ozone precursors, NO_x and VOC's, are shown to have more ozone-emitting sources present onshore. According to USEPA, automobiles and other mobile sources contribute about one-half of the NO_x that is emitted. According to NOAA, power plants emit about one-quarter of the total U.S. human-made contribution of NO_x to the atmosphere. All other sources of NO_x emissions account for one-quarter of the United States' totals.

Shore-based sources of $PM_{2.5}$ include all types of combustion activities related to both human activities and naturally occurring sources. Sources range from large and highly regulated industrial sources down to sources related to activities of an individual such as trash burning. Some of the most cited additional sources include fuel burning associated with motor vehicles, power plants, wood burning, and certain industrial processes.

Fine particulate matter can also form when gases from burning fuels react with sunlight and water vapor. These can result from fuel combustion in motor vehicles, at power plants, and in other industrial processes. Sources of coarse particles, PM_{10}, include crushing or grinding operations and dust from paved or unpaved roads.

Sources of SO_x include all types of activities ranging from large, highly regulated industrial sources, down to sources related to individual human activities such as outdoor grilling. Fossil fuels contain varying amounts of sulfur. Over 65 percent of the SO_x released to the air comes from electric utilities that burn coal. Some additional commonly cited sources of SO_x include pulp and paper mills, petroleum refining, and nonferrous smelters. Fuel burning associated with motor vehicle usage in is another source.

Sources of NO_x includes all types of activities ranging from large, highly regulated industrial sources down to sources related to the activities of individual people, for example, the use of personal watercraft (jet ski). Some of the most commonly city sources of NO_x include motor vehicles, electric utilities, and other industrial commercial and residential sources that burn fuels. Because NO_x is a highly reactive chemical, it can contribute to ozone formation in the presence of VOC's in the presence of heat and sunlight.

Emission trends from Gulfwide platform sources from years 2000, 2005, 2008, and 2011 show that emissions offshore are consistent. A detailed impact analysis of the cumulative impacts of proposed CPA Lease Sale 231 on air quality can be found in Chapter 4.2.1.1.4 of the 2012-2017 WPA/CPA Multisale EIS.

Other major factors influencing coastal environments, such as sand borrowing and transportation in State territorial waters, also generate emissions that can affect air quality. These emissions are regulated by State agencies and/or USEPA. Reductions have been achieved through the use of low sulfur fuels, catalytic reduction, and other efforts, and as a result, constitute minor impacts to onshore air quality.

The incremental contribution of the CPA proposed action (as analyzed in Chapter 4.2.1.1.2 of the 2012-2017 WPA/CPA Multisale EIS) to the cumulative impacts would be minimal. Portions of the Gulf Coast onshore areas have ozone levels that exceed the Federal air quality standard, but the incremental contribution from the CPA proposed action would be very small. The cumulative contribution to

visibility impairment from the CPA proposed action is also expected to be very small. Area visibility is expected to improve somewhat as a result of regional and national programs to reduce emissions. The CPA proposed action would have an insignificant effect on ozone levels in ozone nonattainment areas and would not interfere with the States' schedule for compliance with the NAAQS.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of State and Federal databases, including updates to regulations, was conducted to determine the availability of recent information. No new significant information was discovered from these resources since the publication of the 2012-2017 WPA/CPA Multisale EIS that would impact the conclusions herein. However, BOEM calculated scenario-specific emissions based on the *Year 2008 Gulfwide Emission Inventory Study* (Wilson et al., 2010) and Rigzone (2009). Likewise, BOEM conducted OCD modeling on activity that will result from a lease sale using the scenarios for OCS activities in the CPA. These results are presented in **Table A-6** (**Appendix A**). The modeled impacts are below BOEM's maximum allowable increases, NAAQS, and the U.S. Environmental Protection Agency's SIL's for all the criteria pollutants except for the annual NO_x and the 24-hour $PM_{2.5}$ for PSD Class I areas. Although the SIL's were exceeded, BOEM expects in practice, if the emissions were distributed more realistically across the CPA, that emissions would not exceed the SIL; and thus, actual emissions likely to result from the CPA proposed action would likely not be significant. The modeling that was conducted was overly conservative. All the emissions during 1 year for the entire CPA, which would actually be dispersed throughout the CPA, were modeled as if they originated in Mississippi Canyon Block 856.

Although final summary information and reports on air quality impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup may be forthcoming, USEPA, NOAA, and other agencies obtained and released to the public a large number of air quality measurements indicating that air impacts tended to be minor and below USEPA's health-based standards. As there are no continuing sources of air pollution related to the *Deepwater Horizon* explosion, oil spill, and cleanup, BOEM would not expect any additional measurements or information to alter the conclusions from currently existing data. As such, although there is incomplete or unavailable information on air quality impacts at this time that may be relevant to reasonably foreseeable adverse impacts, this information is not essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

BOEM has reexamined the analysis for air quality presented in the 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 air quality presented in the 2012-2017 WPA/CPA Multisale EIS. The OCD modeling results (included in **Appendix A**) confirms BOEM's conclusions in the 2012-2017 WPA/CPA Multisale EIS that offshore activities would not result in exceedances of the NAAQS at the shoreline. The only potential exception is for ozone, where there may be some minimal contribution to ozone at the shoreline. Ozone levels are on a declining trend because of air-pollution control measures that have been implemented by the States. This downward trend is expected to continue as a result of local as well as nationwide air-pollution control efforts.

The Gulf Coast has significant visibility impairment from anthropogenic emission sources. Area visibility is expected to improve somewhat as a result of regional and national programs to reduce emissions. However, the incremental contribution from the CPA proposed action would be very small and would have an insignificant effect on ozone levels in onshore ozone nonattainment areas. This minimal impact would not be a contributing factor to the States' schedule for attainment. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.2. Water Quality

4.2.1.2.1. Coastal Waters

BOEM has reexamined the analysis for coastal water quality presented in the 2012-2017 WPA/CPA Multisale EIS, 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 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of coastal waters can be found in Chapter 4.2.1.2.1 of the 2012-2017 WPA/CPA Multisale EIS, and new information available since the description was written is discussed below.

The routine activities associated with the CPA proposed action that would impact 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.

A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on coastal waters can be found in Chapter 4.2.1.2.2 of the 2012-2017 WPA/CPA Multisale EIS.

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, USEPA regulations that restrict discharges, and few, if any, new pipeline landfalls or onshore facilities would be constructed.

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, usage of chemical dispersants in oil spill response, spills of chemicals or drilling fluids, loss of well control, collisions, or other malfunctions that would result in such spills. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on coastal waters can be found in Chapter 4.2.1.2.3 of the 2012-2017 WPA/CPA Multisale EIS.

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 and condensate, usage of chemical dispersants in oil-spill response, and spills of chemicals or drilling fluids. The loss of well control, pipeline failures, collisions, or other malfunctions could also result in such spills. 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, hydromodification, and application of dispersants. Natural degradation processes would also decrease the amount of spilled oil over time. For coastal spills, two additional factors that must be considered are the shallowness of the area and the proximity of the spill to shore. Over time, natural processes can physically, chemically, and biologically degrade oil. 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.

Activities in the cumulative scenario that could impact coastal water quality generally include the broad categories of the CPA proposed action and the OCS Program, State oil and gas activity, 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). Many of these categories would cause some of the same specific impacts (e.g., vessel traffic would occur for all of those categories except natural processes). A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on coastal waters can be found in Chapter 4.2.1.2.4 of the 2012-2017 WPA/CPA Multisale EIS.

Water quality in coastal waters would be impacted by sediment disturbance and suspension (i.e., turbidity), vessel discharges, erosion, runoff from nonpoint-source pollutants (including river inflows), seasonal influences, and accidental events. These impacts may be a result of the CPA proposed action and the OCS Program, State oil and gas activity, the activities of other Federal agencies (including the

military), natural events or processes, or 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). The impacts resulting from the CPA proposed action are a small addition to the cumulative impacts on the coastal waters of the Gulf because non-OCS activities, including vessel traffic, erosion, and nonpoint source runoff, are cumulatively responsible for a majority of coastal water impacts. 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. 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.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Various Internet sources were examined and literature searches conducted to assess recent information regarding the water quality and sediment quality in coastal waters that may be pertinent to the CPA. The searches included, but were not limited to, Google, Google Scholar, several USEPA websites, the Gulf of Mexico Sea Grant Programs website, the Coastal Response Research at the University of New Hampshire website, and the NOAA Central Library *Deepwater Horizon*: A Preliminary Bibliography of Published Research and Expert Commentary website. The searches revealed that a recent study independently analyzed chemical data from the *Deepwater Horizon* explosion, oil spill, and cleanup and derived an average environmental release rate for hydrocarbons of $(10.1 \pm 2.0) \times 10^6$ kg/d during the *Deepwater Horizon* oil spill, which confirmed the official average leak rate of $(10.2 \pm 1.0) \times 10^6$ kg/d (Ryerson et al., 2011). Another study found that water-soluble petroleum compounds were found to dissolve into the water column to a greater degree than what is typically observed for surface spills (Reddy et al., 2011). Furthermore, the study indicated that the oil contained approximately 3.9 percent PAH's by weight, which results in an estimated release of 2.1×10^{10} grams of PAH's (Reddy et al., 2011; Reddy, official communication 2012). A study of coastal waters sampled for bioavailable PAH's in Grand Isle, Louisiana; Gulfport, Mississippi; Gulf Shores, Alabama; and Gulf Breeze, Florida, was made using passive sampling devices. The study began sampling prior to any shoreline oiling on May 10, 2010, and continued for more than a year. After the oil spill, bioavailable PAH levels were statistically significantly higher than pre-spill levels; however, the PAH levels at all locations had returned to pre-spill levels by March 2011 (Allan et al., 2012). Elevated PAH concentrations were observed again at the Alabama sampling location in summer 2011. The authors of this study suggested that this increase may be due to resuspension of contaminated sediments or continued nearshore cleanup activities. Increased inputs from other sources and/or climatic factors could not be ruled out (Allan et al., 2012). This research confirms information that was extrapolated in the 2012-2017 WPA/CPA Multisale EIS from then existing data on the *Deepwater Horizon* explosion and oil spill, namely that oil from a catastrophic event under pressure and with more soluble components may become entrained in the water column. As such, this new information has not altered the conclusions from the 2012-2017 WPA/CPA Multisale EIS.

It is currently impossible to estimate precisely the long-term impacts that the spill from the *Deepwater Horizon* explosion will have on coastal water quality. Various monitoring efforts and environmental studies are underway. More time is needed to fully assess the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup. Although response efforts decreased the fraction of oil remaining in Gulf waters and reduced the amount of oil contacting the coastline, oil still remains in the environment (USDOC, NOAA, 2011b and 2011c; OSAT-2, 2011). Oil from the *Deepwater Horizon* explosion and resulting oil spill that appears to have been buried along the coast was unearthed by Hurricane Isaac and was reported to be discovered mostly as tarballs in several locations, including Elmer's Island and Grand Isle, Louisiana, as well as possible locations along the Mississippi and Alabama coasts (Burdeau and Reaves, 2012). Testing at Louisiana State University also confirmed a match to oil resulting from the *Deepwater Horizon* explosion with samples collected from Barataria Bay and the Bay Jimmy area, as well as from the Fort Morgan area in Alabama (Overton, official communication, 2012). Nevertheless, this possibility of resuspended oils or remnants due to natural or anthropogenic causes was identified and discussed in the 2012-2017 WPA/CPA Multisale EIS and remains an ongoing concern.

There remains some incomplete or unavailable information that may be relevant to reasonably foreseeable impacts on coastal water quality. Much of this information relates to the *Deepwater Horizon* explosion, oil spill, and cleanup and is continuing to be collected and developed through the NRDA

process. These data collection and research projects may be years from completion. Few data or conclusions have been released to the public to date. Regardless of the costs involved, it is not within BOEM's ability to obtain this information from the NRDA process within the timeline of this Supplemental EIS.

In light of this incomplete and unavailable information, BOEM's subject-matter experts have used credible scientific information that is available and applied it using scientifically accepted methodology. Given the available data on sediments and water quality that have been released, as described above, BOEM believes that this incomplete or unavailable information is not essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS.

Additionally, the NPDES general permit for new and existing sources and new discharges in the offshore subcatergory of the oil and gas extraction point source category for the western portion of the Gulf of Mexico OCS (GMG290000; USEPA Region 6) was reissued on October 1, 2012, and will expire on September 30, 2017.

Summary and Conclusion

BOEM has reexamined the analysis for coastal water quality presented in the 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 water quality presented in the 2012-2017 WPA/CPA Multisale EIS, as these newly available studies confirmed earlier estimates of hydrocarbon releases and noted the overall return of pre-spill PAH concentrations thus far. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.2.2. Offshore Waters

BOEM has reexamined the analysis for offshore water quality presented in the 2012-2017 WPA/CPA Multisale EIS, 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 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of offshore waters can be found in Chapter 4.2.1.2.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

The routine activities associated with the CPA proposed action that would impact 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.

A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on offshore waters can be found in Chapter 4.2.1.2.2.2 of 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 oil concentration of approximately 15 ppm as established by 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, usage of chemical dispersants in oil spill response, spills of chemicals or drilling fluids, and loss of well control, collisions, or other malfunctions that would result in such spills. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on offshore waters can be found in Chapter 4.2.1.2.2.3 of the 2012-2017 WPA/CPA Multisale EIS.

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, usage of chemical dispersants in oil-spill response, 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 because collisions occur infrequently. Overall, loss of well control events and blowouts are rare events and of short duration, so 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 physical, chemical, and biological processes would decrease the amount of spilled oil over time through dilution, weathering, and degradation of the oil (NRC, 2003). 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. Although there is the potential for accidental events, the CPA proposed action would not significantly change the water quality of the Gulf of Mexico over a large spatial or temporal scale.

Activities in the cumulative scenario that could impact offshore water quality generally include the broad categories of the CPA proposed action and the OCS Program, the activities of other Federal agencies (including the military), natural events or processes, State oil and gas activity, 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). 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. Many of these categories noted above would have some of the same specific impacts (e.g., vessel traffic would occur for all of these categories listed above except natural processes). A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on offshore waters can be found in Chapter and 4.2.1.2.2.4 of the 2012-2017 WPA/CPA Multisale EIS.

Water quality in offshore waters may be impacted by sediment disturbance and suspension (i.e., turbidity), vessel discharges, erosion and runoff of nonpoint-source pollutants (including river inflows), natural seeps, discharges from exploration and production activities, and accidental events. These impacts may be a result of the CPA proposed action and the OCS Program, the activities of other Federal agencies (including the military), private vessels, and natural events or processes. To a lesser degree, these impacts may also be a result of State oil and gas activity or activities or 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). 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 large-scale spill 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). 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 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 the 2012-2017 WPA/CPA Multisale EIS

Various Internet sources were examined and literature searches conducted in order to assess recent information regarding the water quality and sediment quality in offshore waters that may be pertinent to

the CPA. The searches included, but were not limited to, Google, Google Scholar, several USEPA websites, the Gulf of Mexico Sea Grant Programs website, the Coastal Response Research at the University of New Hampshire website, and the NOAA Central Library *Deepwater Horizon*: A Preliminary Bibliography of Published Research and Expert Commentary website. The searches revealed that a recent study independently analyzed chemical data from the *Deepwater Horizon* explosion, oil spill, and cleanup and derived an average environmental release rate for hydrocarbons of (10.1± 2.0) x 10^6 kg/d during the *Deepwater Horizon* oil spill, which confirmed the official average leak rate of (10.2 ± 1.0) x 10^6 kg/d (Ryerson et al., 2011). Another study found that water-soluble petroleum compounds were found to dissolve into the water column to a greater degree than what is typically observed for surface spills (Reddy et al., 2011). Furthermore, the study indicated that the oil contained approximately 3.9 percent PAH's by weight, which results in an estimated release of 2.1 x 10^{10} grams of PAH's (Reddy et al., 2011; Reddy, official communication 2012). This research confirms information that was extrapolated in the 2012-2017 WPA/CPA Multisale EIS from then existing data on the *Deepwater Horizon* explosion, oil spill, and cleanup, namely that oil from a catastrophic event under pressure and with more soluble components may become entrained in the water column. As such, this new information has not altered the conclusions from the 2012-2017 WPA/CPA Multisale EIS.

The zone of hypoxia in the GOM on the Louisiana-Texas shelf was reported to be 2,889 mi^2 (7,482 km^2) in 2012, which is the fourth smallest on record since scientists began mapping the area in 1985 (USDOC, NOAA, 2012b); the decrease in size of the dead zone is suspected to be due to drought conditions decreasing the amount of runoff to the Mississippi River watershed. There have also been reports of hypoxic zones in addition to the one on the Louisiana-Texas shelf. Separate zones of hypoxia were discovered in other shelf regions, such as a recent dead zone that stretched from Chandeleur Sound off Louisiana's coast to Alabama's Dauphin Island and possibly beyond (McConnaughey, 2012). This area is wider than what was found in 2010; however, the study area was also larger than what was studied in 2010. More stagnant water (i.e., a lack of ocean currents) is suspected to be the more dominant factor in the development of this hypoxic zone as compared with the more widely known area on the Louisiana-Texas shelf, which has been attributed to excess nutrients coming from the Mississippi River.

It is currently impossible to estimate precisely whether there will be long-term impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup on offshore water quality. The *Deepwater Horizon* explosion and oil spill occurred in offshore waters and was of considerable magnitude. Various monitoring efforts and environmental studies are underway. Although response efforts decreased the fraction of oil remaining in Gulf waters and reduced the amount of oil contacting the coastline, oil still remains in the offshore environment, albeit at levels that were considered not actionable by USCG (OSAT, 2010). As such, there is incomplete or unavailable information that may be relevant to reasonably foreseeable impacts on offshore water quality. This information includes data and analyses that may be forthcoming after the *Deepwater Horizon* explosion, oil spill, and cleanup and is continuing to be collected and developed through the NRDA process. These data collection and research projects may be years from completion. Few data or conclusions have been released to the public to date. Regardless of the costs involved, it is not within BOEM's ability to obtain this information from the NRDA process within the timeline of this Supplemental EIS. In light of this incomplete and unavailable information, BOEM's subject-matter experts have used credible scientific information that is available and applied it using scientifically accepted methodology. Given the data samples that are available regarding water quality and sediments after the *Deepwater Horizon* explosion, oil spill, and cleanup, as described above, BOEM believes that this incomplete or unavailable information is not essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS.

The NPDES general permit for new and existing sources and new discharges in the offshore subcatergory of the oil and gas extraction point source category for the western portion of the Gulf of Mexico OCS (GMG290000; USEPA Region 6) was reissued October 1, 2012, and will expire on September 30, 2017.

Summary and Conclusion

BOEM has reexamined the analysis for offshore waters presented in the 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 offshore waters presented in the 2012-2017

WPA/CPA Multisale EIS, as these newly available studies confirmed earlier estimates of hydrocarbon releases and noted the overall return to pre-spill PAH concentrations thus far. Furthermore, efforts to better understand and prevent hypoxia are ongoing. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.3. Coastal Barrier Beaches and Associated Dunes

BOEM has reexamined the analysis for coastal barrier beaches and associated dunes presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of coastal barrier beaches and associated dunes can be found in Chapter 4.2.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS.

The primary impact-producing routine activities associated with the CPA proposed action that could affect these environments include pipeline emplacements, navigation channel use (vessel traffic) and dredging, and the use and construction of support infrastructure. A detailed discussion of impacts of OCS activities associated with proposed CPA Lease Sale 231 on coastal barrier beaches and associated dunes can be found in Chapter 4.2.1.3.2 of the 2012-2017 WPA/CPA Multisale EIS.

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 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 regulations. 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.

Maintenance dredging of barrier inlets and bar channels is expected to occur, which, combined with channel jetties, causes minor and localized impacts on adjacent barrier beaches. Mitigating adverse impacts should be addressed in accordance with requirements set forth by the appropriate Federal and State permitting agencies. Because these impacts occur regardless of the CPA proposed action, the CPA proposed action would account for a small percentage of these impacts from routine events. There could be a slight chance of disturbing or resuspending buried, remnant oil from the *Deepwater Horizon* explosion and oil spill through channel maintenance or trenching associated with pipeline placement. However, based on sediment analyses in the OSAT report (2010), there were no exceedances of USEPA's aquatic life benchmarks for PAH's in sediment beyond 3 km (~2 mi) from the wellhead that were linked to the oil from the *Deepwater Horizon* explosion and oil spill. Since dredging, vessel traffic, and pipeline emplacement activities would be far removed from most affected areas, the chance of resuspension of toxic sediment would be improbable.

The CPA proposed action is not expected to adversely alter barrier beach configurations much beyond existing, ongoing impacts in localized areas or to result in remobilizing toxic remnant oil. Strategic placement of dredged material from channel maintenance, channel deepening, and related actions can mitigate adverse impacts upon those localized areas.

The main accidental impact-producing factors that would affect coastal barrier beaches and associated dunes are oil spills and cleanup activities. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on coastal barrier beaches and associated dunes can be found in Chapter 4.2.1.3.3 of the 2012-2017 WPA/CPA Multisale EIS.

Due to the proximity of inshore spills to barrier islands and beaches, inshore 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 utilized in inshore 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 (most coastal spills are expected to be around 77 bbl; refer to Chapter 3.2.1.7.1 of the 2012-2017 WPA/CPA Multisale EIS). Offshore-based crude oil would likely be lessened in toxicity when it reaches the coastal environments. This is due to the distance from shore, the weather, the time oil remains offshore, and the dispersant used. Equipment and personnel used in cleanup efforts can generate the greatest direct impacts to the area, such as the disturbance of 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.

Although monitoring is still ongoing, the current data show that the toxic components of remnant oil are expected to continue to decline (OSAT-2, 2011). Therefore, the currently available information suggests that impacts on barrier islands and beaches from accidental impacts associated with the CPA proposed action would be minimal. However, the long-term effects of the berm construction on Chandeleur Island cannot be evaluated at this time due to the lack of long-term monitoring data concerning the change in hydrological conditions created by the construction. Should a spill other than a catastrophic spill 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. The CPA proposed action would not pose a significant increase in risk to barrier island or beach resources.

This cumulative analysis considers the effects of impact-producing factors related to the CPA proposed action, prior and future OCS sales in the Gulf of Mexico, State oil and gas activities, other governmental and private projects and activities, and pertinent natural processes that may affect barrier beaches and dunes. Specific impact-producing factors considered in this cumulative analysis include channelization of the Mississippi River, beach protection and stabilization projects, natural processes, navigation channels, development and urbanization, oil spills, oil-spill response and cleanup activities, pipeline landfalls, potential for nearshore salinity modifications (preparation of salt domes for oil storage), tourism, and recreational activities. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on coastal barrier beaches and associated dunes can be found in Chapter 4.2.1.3.4 of the 2012-2017 WPA/CPA Multisale EIS.

River channelization, sediment deprivation, tropical and extra-tropical storm activity, sea-level rise, and rapid submergence have resulted in severe and rapid erosion of most of the barrier and shoreline landforms along the Louisiana coast. The barrier system of coastal Mississippi and Alabama is also supported on a coastal barrier platform of sand. Beach stabilization projects, such as groins and jetties, are considered by coastal geomorphologists and engineers to accelerate coastal erosion. Beneficial use of maintenance dredged materials and other restoration techniques could be required to mitigate some of these impacts.

The impacts of oil spills from both OCS and non-OCS sources to the sediment-deficient Louisiana coast would likely not result in long-term alteration of landforms, provided the beaches are cleaned using techniques that do not significantly remove sand from the beach or dunes. The barrier beaches of deltaic Louisiana and the Chenier Plain have the greatest risks of sustaining impacts from oil-spill landfalls because of the high concentrations of oil production near those coasts. However, the majority of inshore spills are assumed to be small in scale (most coastal spills are expected to be around 77 bbl ; Chapter 3.2.1.7.1 of the 2012-2017 WPA/CPA Multisale EIS) and short in duration; therefore, impacts would tend to be minor. Oil from most offshore spills is assumed to be weathered and normally treated offshore; therefore, most of the toxic components have dissipated by the time it would contact coastal beaches. The cleanup impacts of these spills could result in short-term (up to 2 years) adjustment in beach profiles and configurations as a result of sand removal and disturbance during the cleanup operations. Some contact to lower areas of sand dunes is expected. These contacts would not result in significant destabilization of the dunes. All cleanup efforts would be monitored to ensure the least amount of disturbance to the areas. 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. As found in the OSAT-2 report (2011), the level of toxics found in buried or weathered oil on the beach or dune face should be evaluated prior to cleanup operations. The report noted that, in some cases, the toxic level was sufficiently low and would continue to decline; therefore, there was more risk of damaging habitat and biota from cleanup than leaving the weathered oil in place.

Under the cumulative scenario, one new OCS-related and non-OCS pipeline landfalls are projected. These pipelines are expected to be installed using modern techniques, which cause little to no impacts to the barrier islands and beaches. Some existing pipelines that were placed on barrier islands using older techniques left canals or shore protection structures along their path. These canals and structures have caused and can continue to cause barrier beaches to narrow and breach.

The CPA proposed action projects 0-1 pipeline landfalls, and in the event that a pipeline landfall occurs, there would likely be no effect to barrier islands due to permitting and siting requirements and current construction techniques. Aging pipelines and infrastructure continue to be problematic, and the potential for spills could exist until they are replaced. Improperly abandoned wells can also have a potential to create spills, especially in the shallow State waters.

Recreational use of many barrier beaches in the WPA is intense due to their accessibility by road; however, because of the inaccessibility of most of the CPA barrier coast to humans, recreational use is not expected to result in significant impacts to most beaches.

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 both severe local impacts and the acceleration of 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 (Louisiana), and parish governments have made efforts over the last 10 years to slow the landward retreat of Louisiana's Gulf shorelines.

BOEM acknowledges that there remains incomplete and unavailable information that may be relevant to reasonably foreseeable significant impacts on barrier beaches and associated dunes. This incomplete or unavailable information includes potential data on the *Deepwater Horizon* explosion, oil spill, and cleanup that may be forthcoming. As there is substantial information available since the *Deepwater Horizon* explosion, oil spill, and cleanup, which is included in this Supplemental EIS and in the 2012-2017 WPA/CPA Multisale EIS, BOEM believes that the incomplete or unavailable information regarding effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on coastal barrier beaches and dunes would likely not be essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. The bulk of this information is expected to be developed through the ongoing NRDA process. To date, relatively little raw data have been released publicly by the NRDA process, and it may be years before studies are completed and results are released. This information will certainly not be available within the timeframe contemplated by this NEPA analysis. Regardless of the costs involved, it is not within BOEM's ability to obtain this information from the NRDA process within the timeline of this Supplemental EIS. BOEM's subject-matter experts have used what scientifically credible information is available in their analyses and applied it using accepted scientific methodology. Compared with the historic and ongoing threats to coastal barrier beaches and dunes, such as development threats, natural factors such as hurricanes, and channelization, any remaining effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on coastal barrier beaches and dunes is expected to be small.

The CPA proposed action is not expected to adversely alter barrier beach configurations significantly beyond existing, ongoing impacts in localized areas downdrift of artificially jettied and maintained channels. The CPA proposed action may extend the life and presence of facilities in eroding areas, which would accelerate erosion in those areas. Strategic placement of dredged material from channel maintenance, channel deepening, and related actions could mitigate adverse impacts upon those localized areas. The CPA proposed action is not expected to increase the probabilities of oil spills beyond the current estimates. Thus, the incremental contribution of the CPA proposed action to the cumulative impacts on coastal barrier beaches and associated dunes is expected to be small.

New Information Available Since the 2012-2017 WPA/CPA Multisale 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 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, CSA Illumina, and JSTOR) were checked for new information using general Internet searches based on themes. No new significant information was discovered since the publication of the 2012-2017 WPA/CPA Multisale EIS.

Hurricane Isaac made landfall on the Louisiana coast on August 28, 2012. Storm surge and superimposed waves inundated and overwashed the barrier islands that lie to the east of the Mississippi River, e.g. the Chandeleur Islands, Louisiana, and Dauphin Island, Alabama, both of which were severely impacted during Hurricane Katrina in 2005. During Hurricane Isaac, these islands suffered considerable changes, including the apparent destruction of remnants of the oil-protection berm built on the Chandeleur Islands after the *Deepwater Horizon* explosion, oil spill, and cleanup (USDOI, GS, 2012b).

The SCAT maps and new data available since the *Deepwater Horizon* explosion, oil spill, and cleanup that are incorporated into this Supplemental EIS provide valuable information on the status of coastal barrier beaches and dunes that may have been impacted by the event. After Hurricane Isaac made landfall, oil that matched the fingerprint of the oil from the *Deepwater Horizon* explosion and oil spill was found on Elmer's Island and Grand Isle, Louisiana (Overton, official communication, 2012). Tarballs collected on the Alabama coast after Hurricane Isaac appeared "remarkably similar" in composition and consistency to tar found on State beaches during and immediately after the BP spill (Hayworth, official communication, 2012). These observations suggest that oil and tar from the *Deepwater Horizon* explosion remain in the nearshore Gulf where they can be resuspended and deposited on barrier beaches by storms.

BOEM acknowledges that there remains incomplete and unavailable information, particularly related to the *Deepwater Horizon* explosion, oil spill, and cleanup, that may be relevant to reasonably foreseeable significant impacts on these resources. As there is substantial information available since the *Deepwater Horizon* explosion, oil spill, and cleanup, which is included in this Supplemental EIS, BOEM believes that the incomplete or unavailable information regarding effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on coastal barrier beaches and dunes would likely not be essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. The bulk of this information is expected to be developed through the ongoing NRDA process. To date, relatively little raw data have been released publicly by the NRDA process, and it may be years before studies are completed and results are released. This information will certainly not be available within the timeframe contemplated by this NEPA analysis. Regardless of the costs involved, it is not within BOEM's ability to obtain this information from the NRDA process within the timeline of this Supplemental EIS. BOEM's subject-matter experts have used what scientifically credible information is available in their analyses and applied it using accepted scientific methodology. The likelihood of any accidental event reaching coastal barrier beaches remains remote due to the fact that most routine activities are far removed from coastal barrier beaches and dunes. Most activities that could result in inshore spills (e.g., vessel traffic) would also likely be in navigational channels at some distance from most barrier beaches and dunes.

Summary and Conclusion

BOEM has reexamined the analysis for barrier beaches and dunes presented in the 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 barrier beaches and dunes presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.4. Wetlands

BOEM has reexamined the analysis for wetlands presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for wetlands presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the

resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of wetlands can be found in Chapter 4.2.1.4.1 of the 2012-2017 WPA/CPA Multisale EIS.

The primary impact-producing activities associated with the CPA proposed action that could affect wetlands and marshes include pipeline emplacement, construction, and maintenance; navigation channel use (vessel traffic) and maintenance dredging; disposal of OCS-related wastes; and use and construction of support infrastructure in these coastal areas. Other potential impacts that are indirectly associated with OCS oil and gas 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. A detailed impact analysis of the impacts of OCS activities associated with proposed CPA Lease Sale 231 on wetlands can be found in Chapter 4.2.1.4.2 of the 2012-2017 WPA/CPA Multisale EIS.

It is expected that impacts 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-related vessel traffic, contributing to the erosion and widening of navigation channels and canals. This would cause approximately 1 ha (3 ac) of landloss per year. 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 mitigation measures that would be used to further reduce these impacts.

The main impact-producing factors that would affect wetlands are oil spills. With the reduced protection of the barrier islands lost due to hurricanes and anthropogenic factors, there is a greater potential for the oiling of coastal wetlands during an accidental event. Both coastal and offshore oil spills can be caused by large tropical cyclone events such as Hurricanes Katrina, Rita, Gustav, and Ike. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on wetlands can be found in Chapter 4.2.1.4.3 of the 2012-2017 WPA/CPA Multisale EIS.

Offshore oil spills resulting from the CPA proposed action would have a low probability of contacting and damaging any wetlands along the Gulf Coast, except in the case of a catastrophic event (Appendix B of the 2012-2017 WPA/CPA Multisale EIS). 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 currents. Although the probability of occurrence is low, the greatest threat from an oil spill to wetland habitat is from an inland spill as a result of a 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 minor impacts to wetland habitat and surrounding 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 treatment. 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 nature of the system, regulations, and specific cleanup techniques.

The main factors that cumulatively affect wetlands are dredging, navigation channels and canals, pipelines, oil spills, flood control modifications, and development of wetlands. The contribution of the OCS Program and proposed action activities to these cumulative impacts remains small. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on wetlands can be found in Chapter 4.2.1.4.4 of the 2012-2017 WPA/CPA Multisale EIS.

Wetlands are most vulnerable to inshore or nearshore oil spills but these tend to be localized events. Spill sources include vessel collisions, pipeline breaks, and shore-based transfer, refining, and production

facilities. The wetlands associated with the CPA proposed action have a minimal probability for oil-spill contact. This reduced risk is due to the distance of the offshore facility to wetland sites, beach and barrier island topography (although locally reduced post-Hurricanes Katrina and Rita), and product transportation through existing pipelines or pipeline corridors. Wetlands can also be at risk for offshore spills, but the risks are minimized by distance, time, sea conditions, weather conditions, and the implementation of a timely and appropriate spill-response effort.

If spills do reach shore, only light localized impacts to inland wetlands would occur. The wetland areas affected by the *Deepwater Horizon* explosion, oil spill, and cleanup, with the possible exception of extremely heavily oiled areas (Bay Jimmy), have already shown signs of recovery through new shoot production and plant growth (White, official communication2010). Silliman et al. (2012) found that, after the *Deepwater Horizon* explosion, 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 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. Initial sampling and analysis in both offshore and nearshore areas affected by the *Deepwater Horizon* explosion, oil spill, and cleanup have been completed by NOAA and OSAT. These preliminary analyses support that the offshore spills become weathered and are reduced in toxicity in most cases. Three types of oil residue (supratidal buried oil, small surface residue balls, and submerged oil mats) were examined and evaluated in a report prepared by OSAT-2 (2011) and submitted to the Gulf Coast Incident Management Team. Their findings indicated that the oil residues were well weathered and showed an 86- to 98-percent depletion of total PAH's. The OSAT report also noted that, due to the effects of weathering, biodegradation, and the location of the buried oil, there would be a minimal risk of leaching from supratidal buried oil. However, if resuspension of oils by storm action occurs, marshes could be exposed to reoiling. The frequency of repetitive oiling of vegetation is an important determinant of the ultimate injury (Mendelssohn et al., 2012). Based on modeling information, PAH concentration of supratidal buried oil in most locations will decrease by 20 percent within 5 years. In some isolated conditions, the PAH's could persist longer (OSAT-2, 2011). If any inland spills occur, they would likely be small and at inland service bases or other support facilities and generally located away from wetlands; therefore, the spills would not be expected to affect wetlands.

While landloss will continue from subsidence and saltwater intrusion, the State of Louisiana and COE have implemented freshwater diversion projects to minimize the effect of this saltwater-induced landloss. Landloss would continue from vessel traffic; however, because of the small increase in traffic caused by the CPA proposed action, this loss would also be minimal. The CPA proposed action would not require any channel maintenance; therefore, no additional wetland loss would result from dredged material disposal. If dredged-material disposal is required, it would likely be beneficially used for marsh creation. The OCS wastes and drilling by-products would be delivered to existing disposal facilities approved by USEPA for handling these materials. Because of existing capacity, no additional expansion into wetland areas is expected.

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. These trends are expected to continue. During the period from 2001 to 2040, between 248,830 and 346,590 ha (614,872 and 856,443 ac) of wetlands would be lost from the Louisiana coastal zone and 1,600-2,000 ha (647-809 ac) would be lost from the Mississippi coastal zone. Wetland losses in the coastal zones of Alabama and Florida are assumed to be comparable with those in Mississippi. New and existing pipeline channels would continue eroding, largely at the expense of wetlands; however, channel armor may be added at a later date through a State's Coastal Management Program, the U.S. Army Corps of Engineers, and U.S. Dept. of the Transportation (refer to Chapter 3.1.1.8 of the 2012-2017 WPA/CPA Multisale EIS). However, these estimates do not take into account the current regulatory programs, modern construction techniques and mitigations, or any new techniques that might be developed in the future. Because of modern construction techniques and mitigation measures, there would be zero to negligible impacts on wetland habitats as a result of a pipeline emplacement. The CPA proposed action represents a small percentage (3-4%) of total OCS

activity (USDOI, MMS, 2007b). Impacts associated with the CPA proposed action are a minimal part of the overall OCS impacts. 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 landloss. Deltaic Louisiana is expected to continue to experience the greatest loss of wetland habitat. Wetland loss is also expected to continue in coastal Mississippi, Alabama, and Florida, but at slower rates. The incremental contribution of the CPA proposed action to the cumulative impacts on coastal wetlands is expected to be small.

New Information Available Since the 2012-2017 WPA/CPA Multisale 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 Science Direct, Elsevier, CSA Illumina, and JSTOR) were checked for new information using general Internet searches based on major themes. No new significant information was discovered since publication of the 2012-2017 WPA/CPA Multisale EIS.

Recent information regarding the impacts to wetlands from Hurricane Isaac, which made landfall in Louisiana on August 28, 2012, has become available. Preliminary assessments suggest that Hurricane Isaac damaged coastal wetlands in a manner that is substantial, but not unprecedented. Damage to coastal wetland areas was evident throughout much of southeast Louisiana. The intensity of hurricane effects was most abundant in areas of upper Breton Sound. Evidence of vegetation stress, such as widespread discoloration, was observed in areas that were directly impacted by hurricane storm surge. The browning and destruction in the marshes east of the Mississippi River in coastal Louisiana appear to be recent, indicating a link to salinity and flooding stress associated with Hurricane Isaac's storm surge (USDOI, GS, 2012c). This new information is consistent with BOEM's analysis in the 2012-2017 WPA/CPA Multisale EIS, noting that wetlands could continue to be threatened from ongoing natural factors, including hurricanes and storms, including potentially through the resuspension of sediments and oils after the *Deepwater Horizon* explosion, oil spill, and cleanup.

BOEM concludes that the unavailable or incomplete information identified in this section and in the 2012-2017 WPA/CPA Multisale EIS may be relevant to foreseeable significant adverse impacts to wetlands. Relevant data on the status of wetlands and marshes after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup may be difficult or impossible to discern from other factors. The NRDA process is ongoing, and to date, much of the information collected as part of the process has not been fully analyzed, and conclusions have not been released to the public. It may be years before NRDA data and conclusions are available. Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, 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, BOEM believes that incomplete or unavailable information regarding unknown effects of the *Deepwater Horizon* explosion, oil spill, and cleanup is not essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. Although there may still be incoming information, there is significant available data on shoreline oiling and the current status of wetlands and marshes from the SCAT and ERMA databases that have assisted BOEM's subject-matter experts in their analyses. Future incoming data are not expected to significantly alter these conclusions, and future impacts from these past events are not expected.

Summary and Conclusion

BOEM has reexamined the analysis for wetlands presented in the 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 wetlands presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.5. Seagrass Communities

BOEM has reexamined the analysis for seagrass communities presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for seagrass communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

The full analyses of the potential impacts of routine activities and accidental events that may be associated with the CPA proposed action and the proposed action's incremental contribution to the cumulative impacts are presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of seagrass communities can be found in Chapter 4.2.1.5.1 of the 2012-2017 WPA/CPA Multisale EIS.

The routine events associated with OCS activities in the CPA that could adversely affect submerged vegetation communities include construction of pipelines, canals, navigation channels, and onshore facilities; maintenance dredging; and vessel traffic (e.g., propeller scars). Many of these activities would result in an increase of water turbidity that is detrimental to submerged vegetation health. Through avoidance and mitigation policies, these effects are generally localized, short term, and minor in nature. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on seagrass communities can be found in Chapter 4.2.1.5.2 of the 2012-2017 WPA/CPA Multisale EIS.

Routine OCS activities in the CPA that may impact seagrasses are not expected to significantly increase in occurrence and range in the near future, with minimal associated nearshore activities and infrastructure, such as the projected one new pipeline landfall. Requirements of other Federal and State programs, such as avoidance of the seagrass and vegetation communities or the use of turbidity curtains, reduce the undesirable effects on submerged vegetation beds from dredging activities. Federal and State permit requirements should ensure pipeline routes avoid high-salinity beds and maintain water clarity and quality. Local programs decrease the occurrence of prop scarring in grass beds, and channels utilized by OCS vessels are generally 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 activities on submerged vegetation in the CPA are expected to be localized and not significantly adverse.

There remains uncertainty regarding the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup on submerged vegetation. At least for submerged vegetation in Louisiana, Mississippi, and Alabama, BOEM cannot definitively determine that the incomplete or unavailable information being developed through the NRDA process may be essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. Nevertheless, the ongoing research on submerged vegetation after the *Deepwater Horizon* explosion, oil spill, and cleanup is being conducted through the NRDA process. These research projects may be years from completion, and data and conclusions have not been released to the public. Regardless of the costs involved, it is not within BOEM's ability to obtain this information from the NRDA process within the timeline of this Supplemental EIS. In light of this incomplete and unavailable information, BOEM's subject-matter experts have used credible scientific information that is available and applied it using scientifically accepted methodology. Nevertheless, impacts to submerged vegetation from routine activities of the CPA proposed action are expected to be minimal due to the distance of most activities from the submerged vegetation beds, because the 0-1 pipeline landfalls and maintenance dredging are heavily regulated and permitted, and because mitigations (such as turbidity curtains and siting away from beds) would likely be required. Accidental events possible with the CPA proposed action that could significantly adversely affect submerged vegetation beds include nearshore and inshore spills connected with the transport and storage of oil. Offshore oil spills that occur in the proposed action area are less likely to contact seagrass communities than are inshore spills because the seagrass beds are generally protected by barrier islands, peninsulas, sand spits, and currents. However, if the temporal and spatial duration of the spill is sufficiently large, then an offshore spill could affect submerged vegetation communities. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on seagrass communities can be found in Chapter 4.2.1.5.3 of the 2012-2017 WPA/CPA Multisale EIS.

The greatest threat to inland, submerged vegetation communities would be from an inland spill resulting from a vessel accident or pipeline rupture, although such a spill's size tends to be small and the duration short. The resulting slick may cause short-term and localized impacts to the submerged vegetation bed. There is also the remote possibility of an offshore spill to such an extent that it could also affect submerged vegetation beds, and this would have similar effects to an inshore spill. 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 would decrease the detrimental effects to submerged vegetation from the CPA proposed action.

Although as noted above, there remains uncertainty regarding the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup on submerged vegetation. At least for submerged vegetation in Louisiana, Mississippi, and Alabama, BOEM cannot definitively determine that the incomplete or unavailable information being developed through the NRDA process may be essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. Nevertheless, the ongoing research on submerged vegetation after the *Deepwater Horizon* explosion, oil spill, and cleanup is being conducted through the NRDA process. These research projects may be years from completion, and data and conclusions have not been released to the public. Regardless of the costs involved, it is not within BOEM's ability to obtain this information from the NRDA process within the timeline of this Supplemental EIS. In light of this incomplete and unavailable information, BOEM's subject-matter experts have used credible scientific information that is available and applied it using scientifically accepted methodology. Nevertheless, an impact to submerged vegetation from an accidental event related to the CPA proposed action are expected to be minimal due to the distance of most activities from the submerged vegetation beds and because the likelihood of an accidental event of size, location, and duration reaching submerged vegetation spills remains small.

The cumulative events associated with OCS activities in the CPA that could adversely affect submerged vegetation communities include dredging, oil spills/pipelines, hydrological changes, and storm events. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on seagrass communities can be found in Chapter 4.2.1.5.4 of the 2012-2017 WPA/CPA Multisale EIS.

In general, the CPA proposed action would cause a minor incremental contribution to impacts on submerged vegetation from dredging, pipeline installations, possibly oil spills, and boat scarring. Dredging generates the greatest overall risk to submerged vegetation, while naturally occurring hurricanes cause direct damage to beds. The implementation of proposed lease stipulations and mitigation policies currently in place, the small probability of an oil spill, and that flow regimes are expected to change, further reduces the incremental contribution of stress from the CPA proposed action to submerged vegetation.

Unavailable information on the effects to submerged vegetation from the *Deepwater Horizon* explosion, oil spill, and cleanup (and thus changes to the submerged vegetation baseline in the affected environment) makes an understanding of the cumulative effects less clear. BOEM concludes that the unavailable information from these events may be relevant to foreseeable significant adverse impacts to submerged vegetation. Relevant data on the status of submerged vegetation beds after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup may be difficult or impossible to discern from other factors. Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, 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, BOEM believes that incomplete or unavailable information regarding the effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on submerged vegetation is not essential to a reasoned choice among alternatives in the cumulative effects analysis for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. In light of this, the incremental contribution of the CPA proposed action remains minor compared with the cumulative effects of other factors, including dredging, hurricanes, and vessel traffic.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search was conducted for information published on submerged vegetation, and various Internet sources were examined to determine any recent information regarding seagrasses. Sources investigated include BOEM, USDOC/NOAA, 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, Elsevier, CSA Illumina, and JSTOR) were checked for new information using general Internet searches based on major themes. No new significant information was discovered since publication of the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

BOEM has reexamined the analysis for seagrass communities presented in the 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 seagrass communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.6. Live Bottoms

4.2.1.6.1. Live Bottoms (Pinnacle Trend)

BOEM has reexamined the analysis for live bottoms (pinnacle trend) presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for live bottoms (pinnacle trend) presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of the Pinnacle Trend can be found in Chapter 4.2.1.6.1.1 of the 2012-2017 WPA/CPA Multisale EIS.

The routine activities associated with the CPA proposed action that would impact Pinnacle Trend communities in the CPA include anchoring, infrastructure and pipeline emplacement, infrastructure removal, drilling discharges, and produced-water discharges. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on the Pinnacle Trend can be found in Chapter 4.2.1.6.1.2 of the 2012-2017 WPA/CPA Multisale EIS.

The routine activities associated with the CPA proposed action that would impact Pinnacle Trend communities in the CPA include anchoring, infrastructure and pipeline emplacement, infrastructure removal, drilling discharges, and produced-water discharges. Seventy-four blocks are within the region defined as the Pinnacle Trend, which contain live bottoms that may be sensitive to oil and gas activities. These blocks are located in the northeastern portion of the CPA and are located in water depths between 60 and 120 m (197 and 394 ft) in the Main Pass, Viosca Knoll, and Destin Dome lease areas. Relevant leases in past sales have contained a Live Bottom (Pinnacle Trend) Stipulation to protect such areas. The proposed stipulation establishes that no bottom-disturbing activities may occur within 30 m (100 ft) of any hard bottoms/Pinnacles that have a vertical relief of 8 ft (2 m) or more, which distances these features from possible accidental impacts that could occur. The stipulation is designed to prevent drilling activities and anchor emplacement (the major potential impacting factors on these live bottoms resulting from offshore oil and gas activities) from damaging the pinnacle features. Under the stipulation, both exploration and development plans would be reviewed on a case-by-case basis to determine whether a proposed operation could impact a pinnacle feature. If it is determined from site-specific information derived from BOEM studies, published information from other research programs, geohazards survey information, or another source, that the operation would impact a pinnacle feature, the operator may be

required to relocate the proposed operation. Clarification on how the proposed Live Bottom (Pinnacle Trend) Stipulation applies to operators is detailed in this Agency's NTL 2009-G39.

Oil and gas operations discharge drilling muds and cuttings that generate turbidity, potentially smothering benthos near the drill sites. Deposition of drilling muds and cuttings in the Pinnacle Trend area would not greatly impact the biota of the live bottoms because oil and gas operations will be distanced from the Pinnacle features as required in lease stipulations, eliminating direct sedimentation as a result of well discharge. In addition, the biota surrounding the pinnacle features are adapted to turbid (nepheloid) conditions and high sedimentation rates associated with the outflow of the Mississippi River (Gittings et al., 1992), and the Pinnacles themselves are coated with a veneer of sediment, which would allow them to tolerate the sedimentation that may result from the surface release of cuttings when drilling a nearby well. Regional surface currents and water depth would largely dilute any effluent from nearby wells. Additional deposition and turbidity caused by a nearby well are not expected to adversely affect the pinnacle environment because such drilling muds and cuttings would be dispersed upon discharge. Mud contaminants measured in the Pinnacle Trend region reached background levels within 1,500 m (4,921 ft) of the discharge point (Shinn et al., 1993). Toxic impacts on benthos are limited to within 100-200 m (328-656 ft) of a well (Montagna and Harper, 1996; Kennicutt et al., 1996), and NPDES permit requirements limit discharge. The drilling of a well from the CPA proposed action, therefore, could have localized impacts on the benthos nearby the well; however, impacts would be reduced with distance from the well.

The toxicity of the produced waters has the potential to adversely impact the live bottom organisms of the Pinnacle Trend; however, as previously stated, the proposed Live Bottom (Pinnacle Trend) Stipulation would prevent the placement of oil and gas facilities upon (and consequently would prevent the discharge of produced water directly over) the Pinnacle Trend live bottom areas. Because produced waters rapidly disperse and remain in the surface layers of the water column, far above the peaks of Pinnacles, and because the NPDES permit limits discharge, produced waters should not impact these features.

Platform removals have the potential to impact nearby habitats. The platforms are unlikely to be constructed directly on the pinnacles or low-relief areas because of the restraints of the Live Bottom (Pinnacle Trend) Stipulation, if applied, which distances blasts from sensitive habitats. Benthic organisms on live bottoms should also experience limited impact because they are resistant to blasts, tolerant of turbidity, can physically remove some suspended sediment, and may be located above or be tall enough to withstand limited sediment deposition. Live bottoms, however, may be impacted by heavy sediment deposition layers. Implementation of the Live Bottom (Pinnacle Trend) Stipulation would help to prevent such a smothering event. The proposed Live Bottom (Pinnacle Trend) Stipulation could prevent most of the potential impacts on live bottoms from bottom-disturbing activities (structure emplacement and removal) and operational discharges associated with the CPA proposed action. Any contaminants that reach live bottom features would be diluted from their original concentration, so impacts that do occur should be sublethal.

Accidental disturbances resulting from the CPA proposed action, including oil spills and blowouts, have the potential to disrupt and alter the environmental, commercial, recreational, and aesthetic values of live bottom features of the CPA. A catastrophic events analysis is provided in Appendix B of the 2012-2017 WPA/CPA Multisale EIS; nevertheless, the type and kind of expected impacts to Pinnacle Trend features from a catastrophic event would be similar to those described below as impacts from accidental events. A detailed impact analysis of the accidental of that may be associated with proposed CPA Lease Sale 231 on the Pinnacle Trend can be found in Chapter 4.2.1.6.1.3 of the 2012-2017 WPA/CPA Multisale EIS.

Live bottom (Pinnacle Trend) features represent a small fraction of the continental shelf area in the CPA. The small portion of the seafloor covered by these features, combined with the probable random nature of oil-spill locations, serves to limit the extent of damage from any given oil spill to the Pinnacle Trend features.

The proposed Live Bottom (Pinnacle Trend) Stipulation (Chapter 2.4.1.3.2 of the 2012-2017 WPA/CPA Multisale EIS and **Chapter 2.4.1.3.2** of this Supplemental EIS), if applied, would prevent most of the potential impacts from oil and gas operations, including accidental oil spills and blowouts, on the biota of Pinnacle Trend features by increasing the distance of such events from the features. It would be expected that the majority of oil would rapidly rise to the surface and that the most heavily oiled sediments would likely be deposited on the seafloor before reaching the Pinnacle features. However,

operations outside the proposed buffer zones around sensitive habitats (including blowouts and oil spills) may affect live bottom features.

The depth below the sea surface to which many live bottom features rise helps to protect them from surface oil spills. Some Pinnacles may rise to within 40 m (130 ft) of the sea surface; however, many features have much less relief or are in deeper water depths. Any oil that might mix into the water column and contact pinnacle features would probably be at low concentrations because the depth to which surface oil can mix down into the water column is much higher in the water column than the peak of the tallest pinnacles, and this would result in little effect to these features.

A subsurface spill or plume may impact sessile biota of live bottom features. Oil or dispersed oil may cause sublethal impacts to benthic organisms if a plume reaches these features. Impacts may include loss of habitat, biodiversity, and live coverage; change in community structure; and failed reproductive success. The Live Bottom (Pinnacle Trend) Stipulation would limit the potential impact of such occurrences by keeping the sources of such adverse events geographically removed from the sensitive biological resources of live bottom features. The physical distance between oil and gas activities and a Pinnacle feature would allow for dispersion of the oil at it travels in the water column.

Sedimented oil or sedimentation as a result of a blowout may impact benthic organisms. However, because the Live Bottom (Pinnacle Trend) Stipulation places petroleum-producing activity at a distance from live bottom features, this would result in reduced turbidity and sedimentation near the sensitive features. Furthermore, any sedimented oil should be well dispersed, resulting in a light layer of deposition that would be easily removed by the organism and have low toxicity.

The proposed Live Bottom (Pinnacle Trend) Stipulation would assist in preventing most of the potential impacts on live bottom communities from blowouts, surface, and subsurface oil spills and the associated effects. Any contact with spilled oil would likely cause sublethal effects to benthic organisms because the distance of activity would prevent contact with concentrated oil. In the unlikely event that oil from a subsurface spill would reach the biota of a live bottom feature, the effects would be primarily sublethal and impacts would be at the community level due to the oil dispersing with distance traveled. Any turbidity, sedimentation, and sedimented oil would also be at low concentrations by the time the live bottom features were reached, resulting in sublethal impacts.

This cumulative analysis considers the effects of impact-producing factors related to the CPA proposed action plus those related to prior and future OCS lease sales, and to tanker and other shipping operations that may occur and adversely affect live bottoms of the Pinnacle Trend area. Specific OCS-related, impact-producing factors considered in the analysis are structure emplacement and removal, anchoring, discharges from well drilling, produced waters, pipeline emplacement, oil spills, blowouts, and operational discharges. Non-OCS-related impacts including commercial fisheries, natural disturbances, anchoring by recreational boats, and other non-OCS commercial vessels, as well as spillage from import tankering, all have the potential to alter live bottoms, and they are addressed as well. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on the Pinnacle Trend can be found in Chapter 4.2.1.6.1.4 of the 2012-2017 WPA/CPA Multisale EIS.

Non-oil and gas activities that may occur in the vicinity of the Pinnacle communities include recreational boating and fishing, import tankering, fishing and trawling, and natural events such as extreme weather conditions and extreme fluctuations of environmental conditions. These activities could cause damage to the Pinnacle communities. Ships using fairways in the vicinity of Pinnacles anchor in the general area of Pinnacles on occasion, and numerous fishermen take advantage of the resources of regional bottoms. These activities could lead to instances of severe and permanent physical damage to individual formations. During severe storms, such as hurricanes, large waves may reach deep enough to stir bottom sediments (Brooks, 1991; CSA, 1992b). Because of the depth of the Pinnacle Trend area, these forces are not expected to be strong enough to cause direct physical damage to organisms living on the reefs.

Possible impacts from routine activities of OCS oil and gas operations include anchoring, structure emplacement and removal, pipeline emplacement, drilling discharges, and discharges of produced waters. In addition, accidental subsea oil spills, or blowouts associated with OCS oil and gas activities can cause damage to Pinnacle communities. Long-term OCS oil and gas activities are not expected to adversely impact the live bottom environment because these impact-producing factors are restrained by the continued implementation of the lease stipulation and site-specific mitigations. The inclusion of the Live Bottom (Pinnacle Trend) Stipulation would preclude the occurrence of physical damage, the most potentially damaging of these activities. The impacts to the live bottoms are judged to be infrequent

because of the small number of operations in the vicinity of Pinnacles and the distance from the habitat. The impact to the live/hard-bottom resource as a whole is expected to be minimal because of primarily localized impacts.

Impacts from blowouts, pipeline emplacement, muds and cuttings discharges, other operational discharges, and structure removals should be minimized because of the proposed Live Bottom (Pinnacle Trend) Stipulation and the dilution of discharges and resuspended sediments in the area. Potential impacts from discharges would be further reduced by USEPA's discharge regulations and permit restrictions.

The incremental contribution of the CPA proposed action to the cumulative impact is expected to be slight, with possible impacts from physical disturbance of the bottom, discharges of drilling muds and cuttings, other OCS discharges, structure removals, and oil spills. Negative impacts should be restricted by the implementation of the Live Bottom (Pinnacle Trend) Stipulation, site-specific stipulations, the depths of the features, the currents in the live bottom area, and the distance of Pinnacle habitats from the source of impact.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of Internet information sources (the NOAA Gulf Spill Restoration Publications website, the ERMA Gulf Response website, the NOAA *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), as well as recently published journal articles was conducted to determine the availability of recent information on the Pinnacle Trend. The search revealed no new information pertinent to this Supplemental EIS.

Limited data are currently available on potential impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup on Pinnacle Trend features in the CPA. This incomplete or unavailable information may be relevant to reasonably foreseeable significant impacts to Pinnacle Trend features. BOEM has determined that this incomplete or unavailable information may be essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. Relevant data on the status of Pinnacle Trend features after the *Deepwater Horizon* explosion, oil spill, and cleanup, however, may take years to acquire and analyze. Much of this data is being developed through the NRDA process, which is expected to take years to complete. Little data from the NRDA process has been made available to date. Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, regardless of the cost or resources needed. In the place of this incomplete or unavailable information, as noted above, BOEM's subject-matter experts have used available scientifically credible evidence in this analysis and applied it using accepted scientific methods and approaches.

Summary and Conclusion

BOEM has reexamined the analysis for live bottoms (Pinnacle Trend features) presented in the 2012-2017 WPA/CPA Multisale EIS, with the understanding that no new information on these features has been published since the publication of the 2012-2017 WPA/CPA Multisale EIS. Therefore, no new significant information was discovered that would alter the impact conclusion for the Pinnacle Trend features presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.6.2. Live Bottoms (Low Relief)

BOEM has reexamined the analysis for live bottoms (low relief) presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for live bottoms (low relief) presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the

resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of low-relief live bottoms can be found in Chapter 4.2.1.6.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

A number of routine OCS-related factors may cause adverse impacts on the live bottom communities and features. Damage caused by anchoring, infrastructure and pipeline emplacement, infrastructure removal, blowouts, drilling discharges, and produced-water discharges can cause mortality of live bottom organisms or the alteration of sediments to the point that recolonization of the affected areas may be delayed or impossible. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on low-relief live bottoms can be found in Chapter 4.2.1.6.2.2 of the 2012-2017 WPA/CPA Multisale EIS.

The Live Bottom (Low Relief) Stipulation (described in NTL 2009-G39) protection covers lease blocks that include water depths <100 m (328 ft) in the EPA and a portion of the northeastern CPA that was previously part of the EPA. Blocks subject to the Live Bottom (Low Relief) Stipulation, including those in the CPA, are not included in the area to be offered in the CPA proposed action; therefore, the stipulation would not apply to the CPA proposed action. No CPA lease sales since the 1980's have included blocks in areas where this stipulation applies. However, CPA blocks adjacent to this area are included in the CPA proposed action and activities in adjacent blocks may impact features in Live Bottom Stipulation blocks.

Although the Live Bottom (Low Relief) Stipulation would not be applied to proposed CPA Lease Sale 231 (because live bottom [low-relief] blocks are not included in the CPA lease sale), BOEM will still be conducting reviews of proposed OCS oil and gas activities so that any live bottoms that could be impacted by proposed activity are protected. The case-by-case reviews are designed to prevent drilling activities and anchor emplacement (the major potential impacting factors on these live bottoms resulting from offshore oil and gas activities) from damaging the low-relief features. Both exploration and development plans will be reviewed on a case-by-case basis to determine whether a proposed operation could impact a low-relief area. If it is determined from site-specific information derived from BOEM's studies, published information from other research programs, geohazards survey information, or another source that the operation would impact a low-relief area, the operator may be required to relocate the proposed operation.

Oil and gas operations discharge drilling muds and cuttings that generate turbidity, potentially smothering benthos near the drill sites. Deposition of drilling muds and cuttings in surface waters near low-relief areas would not greatly impact the biota of the live bottoms because the biota surrounding the low-relief features in or near the CPA are adapted to turbid (nepheloid) conditions and high sedimentation rates associated with the outflow of the Mississippi River (Gittings et al., 1992). Surface released cuttings would be diluted by regional surface currents, and water depth would largely dilute any effluent before it reached live bottom features. Additional deposition and turbidity caused by the drilling of a well are not expected to adversely affect the low-relief environment because such drilling muds and cuttings would be dispersed upon discharge and be diluted before they reached a live bottom feature. Toxic impacts on benthos are limited to within 100-200 m (328-656 ft) of a well (Montagna and Harper, 1996; Kennicutt et al., 1996), and NPDES permit requirements limit discharge. The drilling of a well, therefore, could have localized impacts on the benthos near the well, but because the well would be located away from live bottom features because live bottom blocks are not being leased as part of this proposed lease sale, impacts would be reduced by dilution with distance from the well.

The toxicity of produced waters has the potential to adversely impact the live bottom organisms; however, as previously stated, many of the low-relief areas are not in the area to be offered in the CPA proposed action and BOEM's site-specific seafloor review prior to any bottom-disturbing activity would prevent the placement of oil and gas facilities upon (and consequently would prevent the discharge of produced water directly over) low-relief, live bottom habitats. Produced waters also rapidly disperse and remain in the surface layers of the water column, far above the live bottom features.

Platform removals have the potential to impact nearby habitats, but the platforms would not be constructed directly on low-relief areas because these areas are not included in the area to be offered in the CPA proposed action and are protected by BOEM policy, distancing blasts from sensitive low-relief habitats. Benthic organisms on live bottoms should also have limited impact because they are resistant to blasts, tolerant of turbidity, can physically remove some suspended sediment, and may be located above or be tall enough to withstand limited sediment deposition. BOEM's site-specific seafloor review and

required distancing of seafloor disturbance from live bottom features would help to prevent smothering events. Since the live bottom areas are either not included in the area to be offered in the CPA proposed action or are protected by BOEM policy, most of the potential impacts on live bottoms from bottom-disturbing activities (structure emplacement and removal) and operational discharges associated with the CPA proposed action would be prevented. Any contaminants that reach live bottom features would be diluted from their original concentration; therefore, impacts that do occur should be sublethal.

Disturbances resulting from the CPA proposed action, including oil spills and blowouts, have the potential to disrupt and alter the environmental, commercial, recreational, and aesthetic values of live bottom features of the CPA. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on low-relief live bottoms can be found in Chapter 4.2.1.6.2.3 of the 2012-2017 WPA/CPA Multisale EIS.

Live bottom (low-relief) features represent a small fraction of the continental shelf area in the CPA. The fact that the live bottom features are widely dispersed, combined with the probable random nature of oil-spill locations, serves to limit the extent of damage from any given oil spill to the live bottom features.

BOEM's case-by-case review of the seafloor in areas where bottom-disturbing activities are planned would prevent most of the potential impacts from oil and gas operations, including accidental oil spills and blowouts, on the biota of live bottom features by increasing the distance of such events from the features. Also, note that none of the blocks with live bottoms are included in the area to be offered in the CPA proposed action. However, operations that occur in blocks adjacent to live bottom habitat may affect live bottom features. It would be expected though that the majority of oil would rapidly rise to the surface and that the most heavily oiled sediments would likely be deposited on the seafloor before reaching the live bottom features.

The limited relief of many live bottom features helps to protect them from surface oil spills. Because the concentration of oil becomes diluted as it physically mixes with the surrounding water and as it moves into the water column, any oil that might be driven to 10 m (33 ft) or deeper would probably be at concentrations low enough to reduce impact to these features. Any features in water shallower than 10 m (33 ft) would be located far from the source of activities in the CPA proposed action, allowing for dilution of oil as it travels in the water column.

A subsurface spill or plume may impact sessile biota of live bottom features. Oil or dispersed oil may cause sublethal impacts to benthic organisms if a plume reaches these features. Impacts may include loss of habitat, biodiversity, and live coverage; change in community structure; and failed reproductive success. The distance of proposed activities from low-relief live bottoms provides considerable protection for the habitats. BOEM's site-specific review of seafloor habitats during the review of project plans would limit the potential impact of any activities that may approach low-relief habitats (such as pipeline right-of-ways) because BOEM policy keeps the sources of such adverse events geographically removed from the sensitive biological resources of live bottom features. The distance would serve to reduce turbidity and sedimentation, and any sedimented oil should be well dispersed, resulting in a light layer of deposition that would have low toxicity and be easily removed by the organism. Many of these organisms are located within the influence of the Mississippi River plume and are more tolerant of turbidity and sedimentation, allowing them to withstand a degree of these impacts.

BOEM's site review would assist in preventing most of the potential impacts on live bottom communities from blowouts, surface, and subsurface oil spills and the associated effects because BOEM policy requires that bottom-disturbing activity be distanced from live bottom features. In addition, because no live bottom (low-relief) blocks are included in the CPA proposed action, the live bottom features are distanced from oil-producing activity. Any contact with spilled oil would likely cause sublethal effects to benthic organisms because the distance of activity would prevent contact with concentrated oil. In the unlikely event that oil from a subsurface spill would reach the biota of a live bottom feature, the effects would be primarily sublethal and impacts would be at the community level. Any turbidity, sedimentation, and sedimented oil would also be at low concentrations by the time the live bottom features were reached, resulting in sublethal impacts.

This cumulative analysis considers the effects of impact-producing factors related to the CPA proposed action plus those related to prior and future OCS lease sales, and to tanker and other shipping operations that may occur and adversely affect live bottoms of low-relief, hard-bottom areas. Specific OCS-related, impact-producing factors considered in the analysis are structure emplacement and removal, anchoring, discharges from well drilling, produced waters, pipeline emplacement, oil spills, blowouts, and operational discharges. Non-OCS-related impacts, including commercial fisheries, natural disturbances,

anchoring by recreational boats, and other non-OCS commercial vessels, as well as spillage from import tankering, all have the potential to alter live bottoms, and they are discussed here as well. A detailed impact analysis of the cumulative accidental impacts of OCS activities associated with proposed CPA Lease Sale 231 on low-relief live bottoms can be found in Chapter 4.2.1.6.2.4 of the 2012-2017 WPA/CPA Multisale EIS.

Non-oil and gas activities that may occur in the vicinity of the low-relief, hard-bottom communities include boating and fishing, import tankering, fishing and trawling, and natural events such as extreme weather conditions and extreme fluctuations of environmental conditions. These activities could cause damage to the low-relief, hard-bottom communities. Occasionally, ships using fairways in the vicinity of communities anchor in the general area of live bottoms, and commercial and recreational fishermen take advantage of the relatively shallow and easily accessible resources of regional hard bottoms. These activities could lead to instances of severe and permanent physical damage. During severe storms, such as hurricanes, large waves may reach deep enough to stir bottom sediments, which could cause severe mechanical damage to organisms, including abrasion from suspended sand, bruising and crushing from tumbling rocks, and complete removal of organisms (Brooks, 1991; CSA, 1992b). Yearly hypoxic events may affect portions of live bottom benthic populations in the northeastern part of the CPA (Rabalais et al., 2002a).

Possible impacts from routine activities of OCS oil and gas operations include anchoring, structure emplacement and removal, pipeline emplacement, drilling discharges, and discharges of produced waters. In addition, accidental subsea oil spills or blowouts associated with OCS oil and gas activities can cause damage to low-relief, hard-bottom communities. Impacts from these factors should be minimized based on BOEM's policy and case-by-case review of proposed OCS oil and gas activity and the fact that live bottom (low-relief) blocks are not currently offered for lease. The physical distance between any routine OCS oil and gas activity and accidental spill would minimize any possible impacts from the activity. The impact to the live bottom resource as a whole is expected to be minimal because of the distance of any OCS oil and gas related activity from these habitats.

The incremental contribution of the CPA proposed action to the cumulative impact is expected to be minimal, with possible impacts from physical disturbance of the bottom, discharges of drilling muds and cuttings, other OCS discharges, structure removals, and oil spills. Negative impacts should be restricted by site-specific BOEM seafloor review, the fact BOEM is not currently offering the low-relief habitats for lease, and the distance of live bottom habitats from the source of most OCS-related impacts.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of Internet information sources (the NOAA Gulf Spill Restoration Publications website, the ERMA Gulf Response website, the NOAA *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), as well as recently published journal articles and Federal documents was conducted to determine the availability of recent information on the low-relief, live bottom habitats. The search revealed new information on the proposed threatened/endangered listing of coral species in the GOM; information that is pertinent to this Supplemental EIS.

In 2009, a petition was submitted to NOAA Fisheries by the Center for Biological Diversity to list 82 additional species of coral under the ESA (USDOC, NOAA, 2012a). Those 82 "candidate species" were reviewed by NOAA Fisheries. In April 2012, NOAA Fisheries completed a Status Review Report and a Draft Management Report of the candidate species of corals, and on December 7, 2012, the Proposed Listing Determinations for 82 Reef-Building Coral Species and Proposed Reclassification of *Acropora palmata* and *Acropora cervicornis* from threatened to endangered was published in the *Federal Register* (2012b). The species proposed for listing as endangered that are found on live bottoms, particularly in the adjacent EPA, include *Montastraea annularis*, *Montastraea faveolata*, *Montastraea franksi*, and *Dendrogyra cylindrus*. Two other species that are found on live bottoms in the EPA that are proposed for listing as threatened are *Agaricia lamarcki* and *Dichocoenia stokesii*. In addition, *Acropora palmata* and *Acropora cervicornis* are proposed to be upgraded from threatened to endangered. These species are listed here because a major oil spill may impact them. If these proposed species are listed, then BOEM would consult with NOAA Fisheries under Section 7 of the ESA if an action may affect the listed species or designated critical habitat, as it currently does for other listed species.

Limited data are currently available on potential impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup on live bottom (low-relief) features in the CPA. This incomplete or unavailable information may be relevant to reasonably foreseeable significant impacts to live bottom (low-relief) features. BOEM has determined that this incomplete or unavailable information may be essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. Relevant data on the status of live bottom (low-relief) features after the *Deepwater Horizon* explosion, oil spill, and cleanup, however, may take years to acquire and analyze. Much of this data is being developed through the NRDA process, which is expected to take years to complete. Little data from the NRDA process have been made available to date. Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, regardless of the cost or resources needed. In the place of this incomplete or unavailable information, as noted above, BOEM's subject-matter experts have used available scientifically credible evidence in this analysis and applied it using accepted scientific methods and approaches.

Summary and Conclusion

BOEM has reexamined the analysis for live bottoms (low-relief features) presented in the 2012-2017 WPA/CPA Multisale EIS, with the understanding that no new information on these features has been published since the publication of the 2012-2017 WPA/CPA Multisale EIS. Therefore, no new significant information was discovered that would alter the impact conclusion for the live bottom, low-relief features presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.7. Topographic Features

BOEM has reexamined the analysis for topographic features presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for topographic features presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of topographic features in the CPA can be found in Chapter 4.2.1.7.1 of the 2012-2017 WPA/CPA Multisale EIS.

The potential impact-producing factors on topographic features of the CPA are anchoring, infrastructure emplacement, drilling-effluent and produced-water discharges, and infrastructure removal. These disturbances have the potential to disrupt and alter the environmental, commercial, recreational, and aesthetic values of topographic features in the CPA. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on topographic features can be found in Chapter 4.2.1.7.2 of the 2012-2017 WPA/CPA Multisale EIS.

The Topographic Features Stipulation, if applied, 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, by requiring individual activities to be located at specified distances from the feature or zone. Because of the No Activity Zone, a buffer that surrounds topographic features in which no bottom-disturbing activity is permitted, additional protective zones in which bottom shunting is required, permit restrictions (including the USEPA discharge regulations and permits), and the high-energy environment and prevailing water currents associated with topographic features, if any contaminants reach topographic features, they would be diluted from their original concentration, and impacts that do occur would be minimal.

Disturbances resulting from the CPA proposed action, including oil spills and blowouts, have the potential to disrupt and alter the environmental, commercial, recreational, and aesthetic values of topographic features of the CPA. A detailed impact analysis of the accidental impacts that may be

associated with proposed CPA Lease Sale 231 on topographic features can be found in Chapter 4.2.1.7.3 of the 2012-2017 WPA/CPA Multisale EIS.

The proposed Topographic Features Stipulation, if applied, would assist in preventing most of the potential impacts on topographic feature communities from blowouts, surface, and subsurface oil spills and the associated effects by increasing the distance of such events from the topographic features. It would be expected that the majority of oil would rapidly rise to the surface and that the most heavily oiled sediments would likely be deposited on the seafloor before reaching the topographic features. Any contact with spilled oil would likely cause sublethal effects to benthic organisms because the distance of activity would prevent contact with concentrated oil. In the unlikely event that oil from a subsurface spill would 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 sediments would also be at low concentrations by the time the topographic features were reached, also resulting in sublethal impacts. Impacts from an oil spill on topographic features are also lessened by the distance of the spill to the features, the depth of the features, and the currents that surround the features.

The cumulative impact from routine oil and gas 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, blowouts, oil spills, and structure removal. Potential non-OCS-related factors include vessel anchoring, 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, commercial fishing, and recreational scuba diving. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on topographic features can be found in Chapter 4.2.1.7.4 of the 2012-2017 WPA/CPA Multisale EIS.

Activities causing mechanical disturbance represent the greatest threat to the topographic features. With respect to OCS leasing-related activities, this would, however, be prevented by the continued application of the proposed Topographic Features Stipulation. Potential OCS oil- and gas-related impacts include anchoring of vessels and structure emplacement, operational discharges (drilling muds and cuttings, and produced waters), blowouts, oil spills, and structure removal.

The proposed Topographic Features Stipulation would preclude mechanical damage caused by oil and gas leaseholders from impacting the benthic communities of the topographic features and would protect them from operational discharges by establishing a buffer around the feature. As such, little impact would be incurred by the biota of the topographic features. The USEPA discharge regulations and permits would further reduce discharge-related impacts.

Blowouts could potentially cause damage to benthic biota; however, due to the application of the proposed Topographic Features Stipulation, blowouts would not reach the No Activity Zone surrounding the topographic features and associated biota, resulting in little impact on the features. If a subsea oil plume is formed, it could contact the habitats of a topographic feature; this contact may be restricted to the lower, less sensitive levels of the banks and/or may be swept around the banks with the prevailing water currents. The farther the oil source is from the bank, the more dilute and degraded the oil would be when it reaches the vicinity of the topographic features.

Oil spills can cause damage to benthic organisms when the oil contacts the organisms. The proposed Topographic Features Stipulation would keep sources of OCS oil and gas spills at least 152 m (500 ft) away from the immediate biota of the topographic features. The majority of oil released below the sea surface rises and should not physically contact organisms on topographic features inside a No Activity Zone. In the unlikely event that oil from a subsurface spill would reach the biota of a topographic feature, it would be physically or chemically dispersed to low concentrations by the time it reached the feature, and the effects would be primarily sublethal. In the very unlikely event that oil from a subsurface spill reached an area containing hermatypic coral cover in lethal concentrations, the recovery could take in excess of 10 years (Fucik et al., 1984). Finally, in the unlikely event a freighter, tanker, or other oceangoing vessel related to OCS Program activities or non-oil- and gas-related activities sank and proceeded to collide with the topographic features or associated habitat releasing its cargo, recovery could take years to decades, depending on the extent of the damage. Because these events are rare in occurrence, the potential of impacts from these events is considered low.

Non-oil and gas activities could mechanically disrupt the bottom (such as anchoring and treasure-hunting activities, as previously described). Natural events such as hurricanes or the collapse of the tops of the topographic features (through dissolution of the underlying salt structure) could cause severe

impacts. The collapsing of topographic features is unlikely and would impact a single feature. Impacts from scuba diving, fishing, ocean dumping, and discharges or spills from tankering of imported oil could have detrimental effects on topographic features.

Overall, the incremental contribution of the CPA proposed action to the cumulative impact is negligible when compared with non-oil and gas impacts. Where the proposed Topographic Features Stipulation is applied, mechanical impacts (anchoring and structure emplacement) and impacts from operational discharges (produced waters, drilling fluids, cuttings) or accidental discharges (oil spills, blowouts) would be removed from the immediate area surrounding the topographic features. However, if the stipulation is not applied, acute long-term injury to topographic features may occur as a result of the CPA proposed action.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of Internet information sources (the NOAA Gulf Spill Restoration Publications website, the ERMA Gulf Response website, the NOAA *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), as well as recently published journal articles and Federal documents was conducted to determine the availability of recent information on topographic features. The search revealed new information on the proposed threatened/endangered listing of coral species in the GOM, information that is pertinent to this Supplemental EIS.

In 2009, a petition was submitted to NOAA Fisheries by the Center for Biological Diversity to list 82 additional species of coral under the ESA (USDOC, NOAA, 2012a). Those 82 "candidate species" were reviewed by NOAA Fisheries. In April 2012, NOAA Fisheries completed a Status Review Report and a Draft Management Report of the candidate species of corals, and on December 7, 2012, the Proposed Listing Determinations for 82 Reef-Building Coral Species and Proposed Reclassification of *Acropora palmata* and *Acropora cervicornis* from threatened to endangered was published in the *Federal Register* (2012b). The coral found in the CPA (on McGrail Bank) proposed for listing as threatened is *Agaricia lamarcki*. If these proposed species are listed, then BOEM would consult with NOAA Fisheries under Section 7 of the ESA if an action may affect the listed species or designated critical habitat, as BOEM currently does for other listed species.

Limited data are currently available on potential impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup on the topographic features in the CPA. This incomplete or unavailable information may be relevant to reasonably foreseeable significant impacts to topographic features. Relevant data on the status of topographic features after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze. Much of this data is being developed through the NRDA process, which may take years to complete. Little data from the NRDA process have been made available to date. Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, regardless of the cost or resources needed. BOEM has determined that this incomplete or unavailable information may be essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. In the place of this incomplete or unavailable information, BOEM's subject-matter experts have used available scientifically credible evidence in this analysis and applied it using accepted scientific methods and approaches.

Summary and Conclusion

BOEM has reexamined the analysis for topographic features presented in the 2012-2017 WPA/CPA Multisale EIS, with the understanding that no new information on topographic features has been published since the release of the 2012-2017 WPA/CPA Multisale EIS. Therefore, no new significant information was discovered that would alter the impact conclusion for topographic features presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.8. Sargassum *Communities*

BOEM has reexamined the analysis for *Sargassum* communities presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for *Sargassum* communities presented

in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of *Sargassum* communities can be found in Chapter 4.2.1.8.1 of the 2012-2017 WPA/CPA Multisale EIS.

Impact-producing factors associated with routine events for the CPA proposed action that could affect *Sargassum* may include the following: (1) drilling discharges (muds and cuttings); (2) produced water and well treatment chemicals; (3) operational discharges (deck drainage, sanitary and domestic water, bilge and ballast water); and (4) physical disturbance from vessel traffic and the presence of exploration and production structures (i.e., rigs, platforms, and MODU's). A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on *Sargassum* communities can be found in Chapter 4.2.1.8.2 of the 2012-2017 WPA/CPA Multisale EIS.

Sargassum, as pelagic algae, is a widely distributed resource that is ubiquitous throughout the northern Gulf of Mexico and northwest Atlantic. Considering its ubiquitous distribution and occurrence in the upper water column near the sea surface, it may be contacted by routine discharges from oil and gas operations. All routine discharges, including produced water, and operational discharges (e.g., deck runoff, bilge water, sanitary effluent, etc.) could potentially contact *Sargassum* algae. However, the quantity and volume of these discharges is relatively small compared with the pelagic waters of the CPA (268,922 km^2; 103,831 mi^2). Therefore, although discharges would contact *Sargassum*, they would only contact a very small portion of the *Sargassum* population. 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* would be minimal.

The impingement effects of discharges by service vessels and working platforms and drillships would contact only a very small portion of the *Sargassum* population. Likewise, impingement effects by service vessels and working platforms and drillships would contact only a very small portion of the *Sargassum* population. The impacts to *Sargassum* 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 and would be resilient to the minor effects predicted. *Sargassum* has a yearly cycle that promotes quick recovery from impacts. No measurable impacts are expected to the overall population of the *Sargassum* community.

Impact-producing factors associated with accidental events for the CPA proposed action that could affect *Sargassum* and its associated communities include (1) surface oil and fuel spills and underwater well blowouts, (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. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on *Sargassum* communities can be found in Chapter 4.2.1.8.3 of the 2012-2017 WPA/CPA Multisale EIS.

All types of spills including surface oil and fuel spills, underwater well blowouts, and chemical spills could potentially contact *Sargassum* algae. The quantity and volume of most of these spills would be relatively small compared with the pelagic waters of the CPA (268,922 km^2; 103,831 mi^2). Therefore, most spills would only contact a very small portion of the *Sargassum* population. Accidental spills would be diluted by the Gulf water and, therefore, concentrations of toxic components would also be reduced in this scenario. The impacts to *Sargassum* that are associated with the CPA proposed action are expected to have only minor effects to a small portion of the *Sargassum* community unless a catastrophic spill occurs. In the case of a very large spill, the *Sargassum* algae community could suffer severe impacts to a sizable portion of the population in the northern Gulf of Mexico. The *Sargassum* community 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.

Several impacting factors can affect *Sargassum*, including impingement by structures and marine vessels, oil and gas drilling discharges, operational discharges, accidental spills, hurricanes, and coastal water quality. A detailed impact analysis of the cumulative impacts of OCS activities associated with

proposed CPA Lease Sale 231 on *Sargassum* communities can be found in Chapter 4.2.1.8.4 of the 2012-2017 WPA/CPA Multisale EIS.

Because of the ephemeral (temporary) nature of *Sargassum* communities, many activities associated with the CPA proposed action would have a localized and short-term effect. *Sargassum* occurs seasonally in almost every part of the northern Gulf of Mexico, resulting in a wide distribution over a very large area. However, its occurrence is patchy, drifting in floating mats that are occasionally impinged on ships and on oil and gas structures. The large, scattered, patchy distribution results in only a small portion of the total population contacting ships, structures, or drilling discharges. There is also a low probability of a catastrophic spill to occur with the CPA proposed action. If such a spill did occur, *Sargassum* in that area is expected to suffer mortality. Offshore activities other than oil and gas activities also have the potential to affect *Sargassum* algae. Shipping traffic would be the largest non-oil and gas activity to impact *Sargassum*. Impingement, routine discharges, and accidental spills could all affect *Sargassum*. However, because of the wide, patchy distribution of *Sargassum*, these activities would have only localized effects. 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-related user group activities is expected to be minimal.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search was conducted for new information published since the publication of the 2012-2017 WPA/CPA Multisale EIS. A search of Internet information sources, including scientific journals, published information from universities and research institutes, and governmental resource agencies, was conducted to determine the availability of new information. No new analyses have been published.

There remains incomplete or unavailable information on the effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on *Sargassum* that may be relevant to reasonably foreseeable significant adverse impacts. What scientifically credible information is available has been applied by BOEM's subject-matter experts using accepted scientific methodologies. Samples and results developed as part of the NRDA process have not been released and there is no timeline for this information becoming available. Nevertheless, BOEM has determined that this incomplete or unavailable information is not essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS, including because *Sargassum* is widely distributed throughout the Gulf and the yearly cycle of replenishment for *Sargassum* indicates that impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup would be significantly reduced or eliminated within a year or two.

Summary and Conclusion

BOEM has reexamined the analysis for *Sargassum* communities presented in the 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 *Sargassum* communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.9. Chemosynthetic Deepwater Benthic Communities

BOEM has reexamined the analysis for chemosynthetic deepwater benthic communities presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of chemosynthetic communities can be found in Chapter 4.2.1.9.1 of the 2012-2017 WPA/CPA Multisale EIS.

Considerable mechanical damage could be inflicted upon deepwater chemosynthetic communities by routine OCS drilling activities associated with the CPA proposed action if mitigations are not applied. 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. 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 described by NTL 2009-G40. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on chemosynthetic communities can be found in Chapter 4.2.1.9.2 of the 2012-2017 WPA/CPA Multisale EIS.

Chemosynthetic communities are susceptible to physical impacts from anchoring, structure emplacement, pipeline installation, structure removal, and drilling discharges. Without mitigation measures, these activities could result in smothering by the suspension of sediments or the crushing of organisms residing in these communities. Because of the avoidance policies described in NTL 2009-G40, the risk of these physical impacts are greatly reduced by requiring the avoidance of potential chemosynthetic communities. Information included in required hazards surveys for oil and gas 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.

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), although it may reappear relatively quickly once the process begins, as in the case of a mussel community (Powell, 1995; Fisher, 1995). Tube-worm communities may be the most sensitive of all communities because of the combined requirements of hard substrate and active hydrocarbon seepage.

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 oil and gas activities in deep water because the impacts would be limited by protections, as described in NTL 2009-G40. Impacts on chemosynthetic communities from routine activities associated with the CPA proposed action would be minimal to none.

Accidental events that could impact chemosynthetic communities are primarily limited to seafloor blowouts. A blowout at the seafloor could create a crater and could resuspend and disperse large quantities of bottom sediments within a 300-m (984-ft) radius from the blowout site. This could bury organisms located within that distance to some degree. The application of avoidance criteria for chemosynthetic communities described in NTL 2009-G40 precludes the placement of a well within 610 m (2,000 ft) of any suspected site of a chemosynthetic community, therefore distancing the chemosynthetic community from sedimentation resulting from a possible blowout. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on chemosynthetic communities can be found in Chapter 4.2.1.9.3 of the 2012-2017 WPA/CPA Multisale EIS.

Chemosynthetic communities could be susceptible to physical impacts from a blowout depending on bottom-current conditions. The guidance provided in NTL 2009-G40 greatly reduces the risk of these physical impacts by requiring a buffer of 610 m (2,000 ft) from wells. It clarifies the requirement to avoid potential chemosynthetic communities identified on the required geophysical survey records prior to approval of the structure emplacement. The 610-m (2,000-ft) avoidance required would protect sensitive communities from heavy sedimentation, with only light sediment components able to reach 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, particularly if hard substrate required for recolonization is buried by resuspended sediments from a blowout.

Potential accidental impacts from the CPA proposed action are expected to cause little damage to the ecological function or biological productivity of widely scattered, high-density chemosynthetic communities located at more than 610 m (2,000 ft) away from a blowout. Chemosynthetic communities could experience minor impacts from resuspended sediments that travel with currents, although the sediment concentration would be diluted with distance from the well. 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 it will become as it mixes with surrounding water.

Accidental impacts associated with the CPA proposed action would likely result in only minimal impacts to chemosynthetic communities with adherence to the proposed biological stipulation and the guidelines described in NTL 2009-G40. One exception would be in the case of a 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.

Cumulative factors considered to impact the deepwater benthic communities (>300 m; 984 ft) of the Gulf of Mexico include both oil- and gas-related and non-oil- and non-gas-related activities. The latter type of impacting factors include activities such as fishing and trawling at a relatively small scale, and large-scale factors such as storm impacts and climate change. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on chemosynthetic communities can be found in Chapter 4.2.1.9.4 of the 2012-2017 WPA/CPA Multisale EIS.

Cumulative impacts to deepwater communities in the Gulf of Mexico are considered negligible because of their remoteness from most impacts and because of the application of BOEM's avoidance criteria as described in NTL 2009-G40. 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-related activities associated with pipelaying, anchoring, structure emplacement, and seafloor blowouts. Drilling discharges and resuspended sediments have a potential to cause minor, mostly sublethal impacts to chemosynthetic communities, but substantial accumulations could result in more serious impacts. Possible catastrophic oil spills due to seafloor blowouts have the potential to devastate localized deepwater benthic habitats. However, these events are rare and would only affect a small portion of the sensitive benthic habitat in the Gulf of Mexico. Recent analyses reveal over 21,000 possible hard-bottom locations across the deepwater GOM (Shedd et al., 2011). Guidance provided in NTL 2009-G40 describes required surveys and avoidance prior to drilling or pipeline installation and would greatly reduce risk. New studies have refined predictive information and confirmed the effectiveness of these provisions throughout all depth ranges of the Gulf of Mexico (Brooks et al., 2009). With the dramatic success of this project, confidence is increasing regarding the use of geophysical signatures for the prediction of chemosynthetic communities.

Activities unrelated to the OCS Program include fishing and trawling. Because of the water depths in these areas (>300 m; 984 ft) and the low density of potentially commercially valuable fishery species, these activities are not expected to impact deepwater benthic comminutes. Regionwide and even global impacts from CO_2 build-up and proposed methods to sequester carbon in the deep sea (e.g., ocean fertilization) are not expected to have major impacts to deepwater habitats in the near future. More distant scenarios could include severe impacts.

The proposed activities in the CPA considered under the cumulative scenario are not expected to cause damage to the ecological function or biological productivity of widely scattered, high-density chemosynthetic communities. They could experience isolated minor impacts from drilling discharges or resuspended sediments, with recovery expected within several years, but even minor impacts are not expected. Major impacts to localized benthic habitat are possible in the event of a catastrophic blowout on the seafloor, particularly when chemical dispersants are applied to oil releases at depth or if oil is ejected under high pressure. If physical disturbance (such as anchor damage) or extensive burial by muds and cuttings were to occur to high-density communities, impacts could be severe, with recovery time as

long as 200 years for mature tube-worm communities. There is evidence that substantial impacts on these communities could permanently prevent reestablishment. Other sublethal impacts include possible incremental losses of productivity, reproduction, community relationships, overall ecological functions of the community, and incremental damage to ecological relationships with the surrounding benthos.

Although OCS activities are the primary impact-producing factors for these communities, the incremental contribution of the CPA proposed action to cumulative impacts is expected to be minimal. BOEM's protective measures would minimize the possible impacts caused by physical disturbance of the seafloor and minor impacts from sediment resuspension or drill cutting discharges through avoidance. Adverse impacts would be limited but not completely eliminated by adherence to guidelines in NTL 2009-G40.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A broad Internet search for relevant new information and scientific journal articles published since the publication of the 2012-2017 WPA/CPA Multisale EIS was conducted using a publicly available search engine. The websites for Federal and State agencies, as well as other organizations, were reviewed for newly released information. Sources investigated include the NOAA Ocean Exploration website, the Gulf of Mexico Alliance, USEPA, USGS, and coastal universities. Ongoing NOAA- and National Science Foundation-funded research projects are investigating chemosynthetic communities and impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup. No new analyses have been published since the publication of the 2012-2017 WPA/CPA Multisale EIS.

Studies and data are continuing to be developed in response to the *Deepwater Horizon* explosion, oil spill, and cleanup. This information will likely be developed through the NRDA process. Unavailable information on the effects to chemosynthetic communities from the *Deepwater Horizon* explosion, oil spill, and cleanup may be relevant to reasonably foreseeable significant impacts on chemosynthetic communities. The NRDA process is investigating impacts to chemosynthetic communities; the limited available information has been considered in this analysis. It may be years before relevant information becomes available, and certainly not within the timeframe contemplated by this NEPA analysis. It is not within BOEM's ability to obtain this information, regardless of the costs involved. Nevertheless, BOEM believes that this incomplete or unavailable information would not be essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS, including because chemosynthetic communities are found throughout the Gulf and are in patchy distributions, minimizing the number that would be likely to be impacted by any single event. BOEM's subject-matter experts have included what credible scientific information is available and applied it using accepted scientific methodologies.

Summary and Conclusion

BOEM has reexamined the analysis for chemosynthetic deepwater benthic communities presented in the 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 chemosynthetic communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.10. Nonchemosynthetic Deepwater Benthic Communities

BOEM has reexamined the analysis for nonchemosynthetic deepwater benthic communities presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of nonchemosynthetic communities can be found in Chapter 4.2.1.10.1 of the 2012-2017 WPA/CPA Multisale EIS.

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. Deepwater live bottom communities, primarily structured by the coral *Lophelia pertusa*, are the nonchemosynthetic deepwater benthic communities that would be sensitive to impacts from oil and gas activities. Bottom-disturbing activities associated with anchoring, structure emplacement, pipelaying, and structure removal cause localized bottom disturbances and disruption of benthic communities in the localized areas. Routine discharge of drill cuttings with associated muds can also affect the seafloor. 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 deepwater coral communities are expected to be extremely rare because of the application of required protective measures described by NTL 2009-G40. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on nonchemosynthetic communities can be found in Chapter 4.2.1.10.2 of the 2012-2017 WPA/CPA Multisale EIS.

Deepwater nonchemosynthetic communities are susceptible to physical impacts from anchoring, structure emplacement, pipeline installation, structure removal, and drilling discharges. Some impact to soft bottom benthic communities from drilling and production activities would occur as a result of physical impacts and drilling discharges regardless of their locations. However, even in situations where the substantial burial of typical, soft bottom benthic infaunal communities occurred, recolonization of populations from widespread neighboring soft bottom substrate would be expected over a relatively short period of time for all size ranges of organisms.

If a sensitive live bottom 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 in 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).

Routine activities associated with the CPA proposed action are not expected to cause damage to the ecological function or biological productivity of sensitive deepwater live bottom communities (deep coral reefs) due to the consistent application of BOEM's protection policies as described in NTL 2009-G40. Information included in required hazards surveys for oil and gas 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, deepwater live bottom communities. Because of the NTL 2009-G40 guidelines, 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.

Impacts on sensitive deepwater communities from routine activities associated with the CPA proposed action would be minimal to none.

Accidental events that could impact nonchemosynthetic deepwater benthic communities are primarily limited to seafloor blowouts. A blowout at the seafloor could create a crater and could resuspend and disperse large quantities of bottom sediments within a 300-m (984-ft) radius from the blowout site. This would destroy any organisms located within that distance by burial or modification of narrow habitat quality requirements. 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 described in NTL 2009-G40 precludes the placement of a well within 610 m (2,000 ft) of any suspected site of a deepwater coral community, therefore distancing the community from sedimentation resulting from a possible blowout. A detailed impact analysis of the accidental impacts that may be associated with

proposed CPA Lease Sale 231 on nonchemosynthetic communities can be found in Chapter 4.2.1.10.3 of the 2012-2017 WPA/CPA Multisale EIS.

Deepwater live bottom communities could be susceptible to physical impacts from a blowout depending on bottom-current conditions. The guidance provided in NTL 2009-G40 and proposed stipulations included in lease sales greatly reduce the risk of these physical impacts. The guidance provided in NTL 2009-G40 and the proposed stipulations clarifies the requirement to avoid potential deepwater live bottom communities identified on the required geophysical survey records prior to approval of the structure emplacement. Substantial impacts on these communities could permanently prevent reestablishment, particularly if hard substrate required for recolonization is buried by resuspended sediments from a blowout.

Accidental events resulting from the CPA proposed action are expected to cause localized damage to the ecological function or biological productivity of widespread, typical, soft bottom benthic communities, with no measurable effect on the wider ecosystem. Some localized impact to benthic communities would occur as a result of impact from an accidental blowout. Megafauna and infauna communities at or below the sediment/water interface would be impacted by the physical disturbance of a blowout or by burial from resuspended sediments. However, even in situations where the substantial burial of typical soft benthic communities occurred, recolonization by populations from neighboring substrate would be expected over a relatively short period for all size ranges of organisms; this can be in a matter of hours to days for bacteria and about 1-2 years for macrofauna species.

Impacts to deepwater coral habitats and other potential hard-bottom communities would likely be avoided as a consequence of the application of the policies described in NTL 2009-G40. The rare, widely scattered, high-density, deepwater live bottom communities located at more than 610 m (2,000 ft) away from a blowout could experience minor impacts from resuspended sediments that travel with currents, although the sediment concentration would be diluted with distance from the well. If dispersants are applied to an oil spill or if oil is ejected into deep water under high pressure (resulting in vigorous turbulence and the formation of micro-droplets), oil could mix into the water column, be carried by underwater currents, and eventually contact the seafloor where it may impact patches of sensitive deepwater community habitat in its path. As with sediments, the farther the dispersed oil travels, the more diluted it will become as it mixes with surrounding water. These potential impacts would be localized because of the directional movement of oil plumes by the water currents, because the sensitive habitats have a scattered and patchy distribution, because the sediments and oil disperse with distance, and because bacteria degrade the oil over time (and distance).

Accidental impacts associated with the CPA proposed action would typically result in only minimal impacts to nonchemosynthetic communities with adherence to the guidelines described in NTL 2009-G40. One exception would be in the case of a catastrophic spill combined with the application of dispersant, or if oil is ejected under high pressure, producing the potential to cause devastating effects on local patches of habitat in the path of subsea plumes where they physically contact the seafloor (Appendix B of the 2012-2017 WPA/CPA Multisale EIS). If such an event were to occur, it could take hundreds of years to reestablish the chemosynthetic community in that location. The possible impacts, however, 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. Oil plumes that remain in the water column for longer periods would disperse and decay, having only minimal effect. Periods as long as hundreds of years are required to reestablish a chemosynthetic seep community once it has disappeared (depending on the community type), although it may reappear relatively quickly once the process begins.

Cumulative factors considered to impact the deepwater benthic communities (>300 m; 984 ft) of the Gulf of Mexico include both oil- and gas-related and non-oil- and non-gas-related activities. The latter type of impacting factors includes activities such as fishing and trawling at a relatively small scale, and large-scale factors such as storm impacts and climate change. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on nonchemosynthetic communities can be found in Chapter 4.2.1.10.4 of the 2012-2017 WPA/CPA Multisale EIS.

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. 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-related activities associated with pipelaying, anchoring, structure emplacement,

and seafloor blowouts. Drilling discharges and resuspended sediments have a potential to cause minor, mostly sublethal impacts to nonchemosynthetic communities, but substantial accumulations could result in more serious impacts. Seafloor disturbance is considered to be a threat only to the high-density communities; widely distributed low-density communities would not be at risk. Possible catastrophic oil spills due to seafloor blowouts have the potential to devastate localized deepwater benthic habitats. However, these events are rare and would only affect a small portion of the sensitive benthic habitat in the Gulf of Mexico. Recent analyses reveal over 15,000 possible hard-bottom locations across the deepwater Gulf of Mexico. However, because the guidance provided in NTL 2009-G40 describes required surveys and avoidance prior to drilling or pipeline installation, the risk would be greatly reduced. New studies have refined predictive information and confirmed the effectiveness of these provisions throughout all depth ranges of the Gulf of Mexico (Brooks et al., 2009). With the dramatic success of this project, confidence is increasing regarding the use of geophysical signatures for the prediction of nonchemosynthetic communities.

Activities unrelated to the OCS Program include fishing and trawling. Because of the water depths in these areas (>300 m; 984 ft) and the low density of potentially commercially valuable fishery species, these activities are not expected to impact deepwater benthic comminutes. Regionwide and even global impacts from CO_2 build-up and proposed methods to sequester carbon in the deep sea (e.g., ocean fertilization) are not expected to have major impacts to deepwater habitats in the near future. More distant scenarios could include severe impacts.

The proposed activities in the CPA considered under the cumulative scenario are not expected to cause damage to the ecological function or biological productivity of widespread, low-density deepwater communities. The rarer, widely scattered, high-density communities could experience isolated minor impacts from drilling discharges or resuspended sediments, with recovery expected within several years, but even minor impacts are not expected. Major impacts to localized benthic habitat are possible in the event of a catastrophic blowout on the seafloor, particularly when chemical dispersants are applied to oil releases at depth or when oil is ejected under high pressure, forming subsea oil plumes. If physical disturbance (such as anchor damage) or extensive burial by muds and cuttings were to occur to high-density communities, impacts could be severe, with recovery time as long as 200 years for mature communities. There is evidence that substantial impacts on these communities could permanently prevent reestablishment. Other sublethal impacts include possible incremental losses of productivity, reproduction, community relationships, overall ecological functions of the community, and incremental damage to ecological relationships with the surrounding benthos.

The cumulative impacts on nonchemosynthetic benthic communities are expected to cause little damage to the ecological function or biological productivity of the expected typical communities existing on sand/silt/clay bottoms of the deep Gulf of Mexico. Large motile animals would tend to move, and recolonization of populations from neighboring substrates would be expected in any areas impacted by burial. The cumulative impacts on deepwater coral or other high-density, hard-bottom communities are expected to be negligible and to cause little damage to the overall ecological function or biological productivity.

Although OCS activities are the primary impact-producing factors for these communities, the incremental contribution of the CPA proposed action to cumulative impacts is expected to be minimal. The possible impacts to these communities are decreased through BOEM's biological review process and the policies described in NTL 2009-G40, which physically distances petroleum-producing activities from sensitive deepwater benthic communities. The incremental contribution of the CPA proposed action to cumulative impacts is expected to be slight and to result from the effects of the possible impacts caused by physical disturbance of the seafloor and minor impacts from sediment resuspension or drill cutting discharges. Adverse impacts would be limited but not completely eliminated by adherence to guidelines in NTL 2009-G40.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A broad Internet search for relevant new information and scientific journal articles published since the publication of the 2012-2017 WPA/CPA Multisale EIS was conducted using a publicly available search engine. The websites for Federal and State agencies, as well as other organizations were reviewed for newly released information. Sources investigated include the NOAA Ocean Exploration website, the Gulf of Mexico Alliance, USEPA, USGS, and coastal universities. Ongoing research projects funded by

NOAA and the National Science Foundation are investigating nonchemosynthetic communities and impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup. No new analyses that are relevant to the above analysis have been published since the publication of the 2012-2017 WPA/CPA Multisale EIS.

Studies and data are continuing to be developed in response to the *Deepwater Horizon* explosion, oil spill, and cleanup. This information will likely be developed through the NRDA process. Unavailable information on the effects to nonchemosynthetic communities from the *Deepwater Horizon* explosion, oil spill, and cleanup may be relevant to reasonably foreseeable significant impacts. The NRDA process is investigating impacts to nonchemosynthetic communities, but information collected to date has not been made available to the public. It may be years before this information becomes available, and certainly not within the timeframe contemplated by this NEPA analysis. It is not within BOEM's ability to obtain this information, regardless of the costs involved. Nevertheless, BOEM believes that this incomplete or unavailable information would not be essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS, including because nonchemosynthetic communities are found throughout the Gulf and are in patchy distributions, minimizing the number that would be likely to be impacted by any single event. In addition, available data indicate significant impacts to one coral community; these impacts were only identified in one location 7 mi (11 km) downcurrent from the *Macondo* well site. BOEM's subject-matter experts have included what credible scientific information is available and applied it using accepted scientific methodologies.

Summary and Conclusion

BOEM has reexamined the analysis for nonchemosynthetic deepwater benthic communities presented in the 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 nonchemosynthetic communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.11. Soft Bottom Benthic Communities

BOEM has reexamined the analysis for soft bottom benthic communities presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of soft bottom benthic communities in the CPA can be found in Chapter 4.2.1.11.1 of the 2012-2017 WPA/CPA Multisale EIS.

Impacts from routine oil and gas activities to the soft bottom benthic communities are discussed in this section, as a majority of the oil and gas exploration would be conducted in soft seafloor sediments. Potential impact-producing factors to these communities include infrastructure emplacement, turbidity and smothering, drilling-effluent and produced-water discharges, and infrastructure removal. Disturbances of soft bottom communities may cause localized alterations to infaunal communities and disruptions to food sources for some large invertebrate and finfish species. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on soft bottom benthic communities can be found in Chapter 4.2.1.11.2 of the 2012-2017 WPA/CPA Multisale EIS.

Impacts from routine activities of OCS oil and gas operations include anchoring, structure emplacement and removal, pipeline emplacement, drilling discharges, and discharges of produced waters. Although localized impacts to comparatively small areas of the soft bottom benthic communities would occur, the impacts would be on a relatively small area of the seafloor compared with the overall area of the seafloor of the CPA (268,922 km^2; 103,831 mi^2) and the CPA and WPA combined (384,567 km^2; 148,482 mi^2). The estimated footprint of platforms on the continental shelf in the Gulf of Mexico is

approximately 20,170,839 ft^2 (1.874 km^2; 0.724mi^2) (LGL Ecological Research Associates, Inc. and Science Applications International Corporation, 1998), which is 0.0005 percent of the estimated area of seafloor in the CPA and WPA combined. Based on these values, the impacts that may occur to the seafloor around platforms would be a fraction of the entire soft bottom community of the GOM. The greatest impact is the alteration of benthic communities as a result of smothering, chemical toxicity, and substrate change. Communities that are smothered by cuttings repopulate, and populations that are eliminated as a result of sediment toxicity or organic enrichment would be taken over by more tolerant species. The community alterations are not so much the introduction of a new benthic community as a shift in species dominance (Montagna and Harper, 1996). These localized impacts generally occur within a few hundred meters of platforms, and the greatest impacts are seen close to the platform. These patchy habitats within the Gulf of Mexico are probably not very different from the early successional communities that predominate throughout areas of the Gulf of Mexico that are frequently disturbed (Rabalais et al., 2002a; Gaston et al., 1998; Diaz and Solow, 1999).

Any accidental 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. The soft bottom substrate is ubiquitous throughout the Gulf of Mexico. Although the likelihood of a low-probability, large-volume catastrophic spill remains remote (Appendix B of 2012-2017 WPA/CPA Multisale EIS), the types or kinds of impacts to soft bottom communities would likely be the same for a smaller scale accidental event. As such, the analysis below addresses both types of spills. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on soft bottom benthic communities can be found in Chapter 4.2.1.11.3 of the 2012-2017 WPA/CPA Multisale EIS.

Because of the small amount of proportional space that OCS activities occupy on the seafloor, only a very small portion of the seafloor of the Gulf of Mexico would be expected to experience lethal impacts in an accidental event, as a result of blowouts, surface and subsurface oil spills, and their associated effects. The greatest impacts would be closest to the spill, and impacts would decrease with distance from the spill. Contact with spilled oil at a distance from the spill would likely cause sublethal to immeasurable effects to benthic organisms because the distance of activity would prevent contact with concentrated oil. Oil from a subsurface spill that reaches benthic communities would be primarily sublethal and impacts would be at the local community level. Any sedimentation and sedimented oil would also be at low concentrations by the time it reaches benthic communities far from the location of the spill, also resulting in sublethal impacts. Also, any local communities that are lost would be repopulated fairly rapidly (Neff, 2005). Although an oil spill may have some detrimental impacts, especially closest to the occurrence of the spill, the impacts may be no greater than natural biological fluctuations (Clark, 1982), and impacts would be to an extremely small portion of the overall Gulf of Mexico.

The cumulative analysis considers the effects of impact-producing factors related to soft bottoms of the Gulf of Mexico continental shelf. The CPA proposed action plus those actions related to prior and future OCS lease sales are considered; in this discussion, these are referred to as "OCS-related" factors. The vast majority of the Gulf of Mexico seabed is comprised of soft sediments and drilling is focused on these sediments, so the greatest number of OCS-related impacts occurs on soft bottom benthic environments. Specific OCS-related, impact-producing factors considered in the analysis are structure emplacement and removal, anchoring, discharges from well drilling, produced waters, pipeline emplacement, oil spills, blowouts, and operational discharges. Other non-OCS-related impacts that may occur and adversely affect soft bottom benthic communities include commercial fisheries, natural disturbances, anchoring by recreational boats and other non-OCS commercial vessels, spillage from import tankering, cable laying, bottom trawling, hypoxia (low oxygen levels [2 ppm]), and storm events; all have the potential to damage soft bottom benthic communities. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on soft bottom benthic communities can be found in Chapter 4.2.1.11.4 of the 2012-2017 WPA/CPA Multisale EIS.

Non-oil and gas activities that may occur on soft bottom benthic substrate include recreational boating and fishing, import tankering, and natural events such as extreme weather conditions and extreme fluctuations of environmental conditions. These activities could cause temporary damage to soft bottom communities. Ships and fishermen anchoring on soft bottoms may crush and smother underlying organisms. Oil spills from non-OCS import tankering or other activity may result in oiled benthic communities that would only repopulate once the concentration of oil in the sediment has decreased. During severe storms, such as hurricanes, large waves may stir bottom sediments, which cause scouring,

remobilization of contaminants in the sediment, abrasion and clogging of gills as a result of turbidity, uprooting benthic organisms from the sediment, and an overall result in decreased species diversity (Engle et al., 2008; Dobbs and Vozarik, 1983). Yearly hypoxic events may eliminate many species from benthic populations over a wide area covering most of the CPA and part of the WPA continental shelf (Rabalais et al., 2002a).

Impacts from routine activities of OCS oil and gas operations include anchoring, structure emplacement and removal, pipeline emplacement, drilling discharges, and discharges of produced waters. In addition, accidental subsea oil spills or blowouts associated with oil and gas activities can cause damage to infaunal communities. Long-term oil and gas activities are not expected to adversely impact the entire soft bottom environment because the local impacted areas are extremely small compared with the entire seafloor of the Gulf of Mexico and because impacted communities are repopulated relatively quickly. Also, USEPA's general NPDES permit restrictions on the discharge of produced water, which require the effluent concentration 100 m (328 ft) from the outfall to be less than the 7-day no observable effect concentration based on laboratory exposures, would help to limit the impacts on benthic communities (Smith et al., 1994).

Impacts from blowouts, pipeline emplacement, muds and cuttings discharges, other operational discharges, and structure removals may have local devastating impacts, but the cumulative effect on the overall seafloor and infaunal communities on the Gulf of Mexico would be very small. Soft bottom benthic communities are ubiquitous throughout and often remain in an early successional stage due to natural fluctuation, and therefore, the activities of OCS production of oil and gas would not cause additional severe cumulative impacts.

The incremental contribution of the CPA proposed action to the cumulative impact is expected to be slight, with possible impacts from physical disturbance of the bottom, discharges of drilling muds and cuttings, other OCS discharges, structure removals, and oil spills. Non-oil and gas factors, such as storms, trawling, non-oil and gas-related spills, and hypoxia, are likely to impact the soft bottom communities on a more frequent basis. Impacts from oil and gas activities are also somewhat minimized by the fact that these communities are ubiquitous through the CPA and can recruit quickly from neighboring areas.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of Internet information sources (the NOAA Gulf Spill Restoration Publications website, the ERMA Gulf Response website, the NOAA *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), as well as recently published journal articles was conducted to determine the availability of recent information on soft bottom benthic communities. The search revealed no new information available since the 2012-2017 WPA/CPA Multisale EIS pertinent to this analysis.

Limited data are currently available on potential impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup on soft bottoms in the CPA. This incomplete or unavailable information may be relevant to reasonably foreseeable significant impacts to soft bottom benthic communities. Relevant data on the status of soft bottom benthic communities after the *Deepwater Horizon* explosion, oil spill, and cleanup, however, may take years to acquire and analyze. Much of this data is being developed through the NRDA process, which may take years to complete. Little data from the NRDA process have been made available to date. Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, regardless of the cost or resources needed. In the place of this incomplete or unavailable information, BOEM's subject-matter experts have used available scientifically credible evidence in this analysis and applied it using accepted scientific methods and approaches. BOEM believes, however, that this incomplete or unavailable information is not essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. Because soft bottoms are ubiquitous in the Gulf of Mexico, are not considered essential fish habitat, and are repopulated relatively quickly from neighboring communities when they are impacted, this incomplete or unavailable information is not likely to be essential to a reasoned choice among alternatives for the reasons stated therein.

Summary and Conclusion

BOEM has reexamined the analysis for soft bottom benthic communities presented in the 2012-2017 WPA/CPA Multisale EIS, with the understanding that no new information on these communities has been published since the publication of the 2012-2017 WPA/CPA Multisale EIS. Therefore, no new significant information was discovered that would alter the impact conclusion for soft bottom benthic communities presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.12. Marine Mammals

BOEM has reexamined the analysis for marine mammals presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for marine mammals presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the publication of that EIS.

A detailed description of marine mammals can be found in Chapter 4.2.1.12.1 of the 2012-2017 WPA/CPA Multisale EIS.

The potential effects on marine mammal species may occur from routine activities associated with the CPA proposed action. The major impact-producing factors affecting marine mammals as a result of routine OCS activities include 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 structures. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on marine mammals can be found in Chapter 4.2.1.12.2 of the 2012-2017 WPA/CPA Multisale EIS.

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; however, when mitigated as required by BOEM and NMFS, these activities are not expected to have long-term impacts on the size and productivity of any marine mammal species or population. Most other routine activities are expected to have negligible effects.

Accidental, unexpected events associated with the CPA proposed action could negatively impact marine mammals. Such impacts would primarily be the result of blowouts, oil spills, and oil-spill-response activities. Low-probability catastrophic events, similar to the *Deepwater Horizon* explosion and oil spill, and cleanup, are analyzed in Appendix B of the 2012-2017 WPA/CPA Multisale EIS. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on marine mammals can be found in Chapter 4.2.1.12.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events 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. Accidental blowouts, oil spills, and spill-response activities may impact marine mammals in the Gulf of Mexico. 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 mammals. Long-term effects include (1) decreases in prey availability and abundance because of increased mortality rates, (2) change in age-class population structure because certain year-classes were impacted more by oil, (3) decreased reproductive rate, and (4) 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 the spill is stopped, oilings or deaths of marine mammals would still occur due to 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.

The cumulative analysis considers past, ongoing, and foreseeable future human and natural activities that may occur and adversely affect marine mammals in the same general area that may be affected by the CPA proposed action. The major potential impact-producing factors affecting protected marine mammals in the GOM as a result of cumulative OCS energy-related activities include marine debris, contaminant spills and spill-response activities, vessel traffic, noise, seismic surveys, and explosive structure removals. Non-OCS energy-related activities that may affect marine mammal populations include vessel traffic and related noise (including from commercial shipping, research vessels), military operations, commercial fishing, pollution, scientific research and natural phenomena. Specific types of impact-producing factors considered in this cumulative analysis include noise from numerous sources, pollution, habitat degradation, vessel strikes, and ingestion and entanglement in marine debris. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on marine mammals can be found in Chapter 4.2.1.12.4 of the 2012-2017 WPA/CPA Multisale EIS.

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-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). The net result of any disturbance will depend upon the size and percentage of the population likely to be affected, the ecological importance of the disturbed area, the environmental and biological parameters that influence an animal's sensitivity to disturbance and stress, or the accommodation time in response to prolonged disturbance (Geraci and St. Aubin, 1980). As discussed in Appendix B of the 2012-2017 WPA/CPA Multisale EIS, a low-probability catastrophic event could have population-level effects on marine mammals.

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 greater impacts to marine mammals than before the *Deepwater Horizon* explosion, oil spill, and cleanup; however, the magnitude of those effects cannot yet be determined. Nonetheless, operators are required to follow all applicable lease stipulations and regulations, as clarified by NTL's, to minimize these potential interactions and impacts. The operator's reaffirmed compliance with NTL 2012-JOINT-G01 ("Vessel Strike Avoidance and Injured/Dead Protected Species Reporting") and 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 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. Therefore, no significant cumulative impacts to marine mammals 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.

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 marine mammal populations. Therefore, the incremental effect of the CPA proposed action on marine mammal populations is not expected to be significant when compared with non-OCS energy-related activities.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Various Internet sources were examined to assess recent information regarding this resource that may be pertinent to the CPA. On December 13, 2010, NMFS declared an unusual mortality event (UME) for cetaceans (whales and dolphins) in the Gulf of Mexico. An 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." Evidence of the UME was first noted by NMFS as early as February 1, 2010, before the *Deepwater Horizon* explosion, oil spill, and cleanup (USDOC, NMFS, 2012a). As of August 19, 2012, a total of 764 cetaceans (5% stranded alive and 95% stranded dead) have stranded since the start of the UME, with a vast majority of these strandings between Franklin County, Florida, and the Louisiana/Texas border. The 764 cetaceans include 6 dolphins killed during a fish-related scientific study and 1 dolphin killed incidental to trawl relocation for a dredging project. More detail on the UME can be found on NMFS's website (USDOC, NMFS, 2012a). In addition to investigating all other potential causes, scientists are investigating what role *Brucella* may have played in the UME and this continues today. The total deaths for just one of the cetaceans, the bottlenose dolphin, currently well exceed the Potential Biological Removal (PBR) (Waring et al., 2011). The PBR level is 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.

On May 9, 2012, NOAA declared an UME for bottlenose dolphins in five Texas counties. The UME lasted from November 2011 through March 2012, when 123 bottlenose dolphins stranded in Aransas, Calhoun, Kleberg, Galveston, and Brazoria Counties in Texas. The investigation is ongoing (USDOC, NMFS, 2012b).

BOEM concludes that the unavailable information resulting from the *Deepwater Horizon* explosion, oil spill, and cleanup and UME, and impacts to marine mammals could be relevant to reasonably foreseeable significant adverse effects. Although activities will be ongoing under existing leases whether or not the CPA proposed action takes place, BOEM at this point cannot determine if potential data and information incoming from the *Deepwater Horizon* explosion, oil spill, and cleanup and UME would be essential to a reasoned choice among the alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. Data are being developed through the NRDA process and at the direction of NMFS (which has jurisdiction over marine mammal strandings). It will be years before the studies currently underway produce available data. Little data, beyond raw numbers of strandings, have been made public through the NRDA process. For example, new data are still being investigated and developed 20 years after the *Exxon Valdez* event (Matkin et al., 2008). This information will not be available within the timeframe contemplated by this NEPA analysis. In its place, the scientifically credible information that is available has been incorporated using accepted scientific methodologies.

Summary and Conclusion

BOEM has reexamined the analysis for marine mammals presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. No new significant information was discovered that would alter the impact conclusion for marine mammals presented in the 2012-2017 WPA/CPA Multisale EIS, although information remains incomplete or unavailable. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.13. Sea Turtles

BOEM has reexamined the analysis for sea turtles presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for sea turtles presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of sea turtles can be found in Chapter 4.2.1.13.1 of the 2012-2017 WPA/CPA Multisale EIS.

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 mitigations that are in place and discussed below. The major impact-producing factors resulting from the routine activities associated with the CPA proposed action that may affect loggerhead, Kemp's ridley, hawksbill, green, and leatherback turtles include the degradation of water quality resulting from operational discharges; noise generated by helicopter and vessel traffic, platforms, drillships, and seismic exploration; vessel collisions; and marine debris generated by service vessels and OCS facilities. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on sea turtles can be found in Chapter 4.2.1.13.2 of the 2012-2017 WPA/CPA Multisale EIS.

Because of the mitigations (e.g., BOEM and BSEE proposed compliance with NTL's) described in the 2012-2017 WPA/CPA Multisale EIS, 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. Lethal effects could occur from chance collisions with OCS service vessels or ingestion of accidentally released plastic materials from OCS vessels and facilities. However, there have been no reports to date on such incidences. Most routine, OCS energy-related activities are then expected to have sublethal effects that are not expected to rise to the level of significance.

Accidental, unexpected events associated with the CPA proposed action could negatively impact sea turtles. Such impacts would primarily be the result of blowouts, oil spills, and spill-response activities. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on sea turtles can be found in Chapter 4.2.1.13.3 of the 2012-2017 WPA/CPA Multisale EIS.

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 Gulf of Mexico, 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. 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.

The cumulative analysis considers the effects of impact-producing factors related to the CPA proposed action along with impacts of other commercial, military, recreational, offshore, and coastal activities that may occur and adversely affect populations of sea turtles in the same general area of the CPA proposed action. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on sea turtles can be found in Chapter 4.2.1.13.4 of the 2012-2017 WPA/CPA Multisale EIS.

Few deaths are expected from chance collisions with OCS service vessels, ingestion of plastic material, commercial fishing, and pathogens. 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 during their life cycle. 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). Lease stipulations and regulations are in place to reduce vessel strike mortalities. As discussed in Appendix B of the 2012-2017 WPA/CPA Multisale EIS, a low-probability, large-scale catastrophic event could have population-level effects on sea turtles.

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 greater impacts to sea turtles than before the *Deepwater Horizon* explosion, oil spill, and cleanup; however, the magnitude of those effects cannot yet be determined. Nonetheless, operators are required to follow all applicable lease stipulations and regulations, as clarified by NTL's, to minimize these potential interactions and impacts. The operator's reaffirmed compliance with NTL 2012-JOINT-G01 ("Vessel-Strike Avoidance and

Injured/Dead Protected Species Reporting") and NTL 2012-BSEE-G01 ("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 proposed drilling activities 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, and the use of a minimum sound source. Therefore, 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.

Adverse effects may result from the incremental contribution of the CPA proposed action combined with non-OCS energy-related activities. The biological significance of any mortality or adverse impact would depend, in part, on the size and reproductive rates of the affected populations, as well as the number, age, and size of animals affected. However, the potential for impacts is mainly focused on the individual, and population-level impacts are not anticipated based on the best available information.

Incremental injury effects from the CPA proposed action on sea turtles are expected to be negligible for drilling and vessel noise and minor for vessel collisions, but it would not rise to the level of significance because of the limited scope, duration, and geographic area of the proposed drilling and vessel activities and the relevant regulatory requirements.

The effects of the CPA proposed action, when viewed in light of the effects associated with other relevant activities, may affect sea turtles occurring in the Gulf of Mexico. With the enforcement of regulatory requirements for drilling and vessel operations and the scope of the CPA proposed action, incremental effects from the proposed drilling activities on sea turtles would be negligible (drilling and vessel noise) to minor (vessel strikes). The best available scientific information indicates that sea turtles do not rely on acoustics; therefore, vessel noise and related activities would have limited effect. Consequently, no significant cumulative impacts would be expected from the CPA proposed action's activities or as the result of past, present, or reasonably foreseeable oil and gas leasing, exploration, development, and production in the Gulf of Mexico. Even taking into account additional effects resulting from non-OCS energy-related activities, the potential for impacts from the CPA proposed action is mainly focused on the individual. Population-level impacts are not anticipated based on the best available information.

In any event, 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-related activities, such as overexploitation, commercial fishing, and pollution, have historically proved to be a greater threat to sea turtles.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Various Internet sources were examined to assess recent information regarding this resource that may be pertinent to the CPA. Since January 1, 2011, a notable increase in sea turtle strandings has occurred in the northern Gulf of Mexico, 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 Gulf—both natural and human causes (USDOC, NMFS, 2012c). The sea turtle species identified in the strandings include loggerhead, green, Kemp's ridley, leatherback, hawksbill, and unidentified. The CPA proposed action also covers these same areas. As of August 19, 2012, NMFS has identified 147 strandings in Alabama, 266 strandings in Louisiana, and 435 strandings in Mississippi. The NMFS has identified 81 strandings in Texas (upper Texas coast—Zone 18).

Over the last 2 years, NOAA has documented necropsy results from many of the stranded turtles indicating mortality due to forced submergence, which is commonly associated with fishery interactions, and acute toxicosis. In June 2011, NMFS announced that it will begin scoping for the preparation of a draft EIS to reduce incidental bycatch and mortality of sea turtles in the southeastern U.S. shrimp fishery (76 FR 37050). On February 8, 2012, NMFS finalized an interim ESA process for project-specific consultation procedures that will remain in place until a new biological opinion is completed. These

stranding issues, which are constantly updated, are being taken into account in the consultations with NMFS to develop the biological opinion. In 2011, loggerhead sea turtle nest counts on Florida's west coast beaches were close to the average of the previous 5 years (68,587 nests). Green sea turtle nest counts have increased approximately tenfold from 1989 to 2011 on Florida index beaches. The green sea turtle west coast nest count in 2011 was the highest for that period (15,352 nests). A near-record number of leatherback nests in 2011 were recorded on west coast beaches in Florida (1,652 nests). Similar to the nest counts for green turtles, leatherback nest counts have been increasing exponentially on Florida index beaches (Florida Fish and Wildlife Conservation Commission, 2012). A total of 84 nests in 2011 along the Alabama Gulf Coast were discovered. Tropical Storm Lee, however, inundated several nests. In 2010, Alabama had reported 41 loggerhead nests and 2 Kemp's ridley nests (Share the Beach, 2012).

BOEM concludes that there remains incomplete or unavailable information that may be relevant to reasonably foreseeable significant adverse impacts to sea turtles, including those from noncatastrophic spills/accidental events. Since March 15, 2011, a notable increase in sea turtle strandings has occurred in the northern Gulf of Mexico, 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. Many of the stranded turtles were reported from Mississippi and Alabama waters, and very few showed signs of external oiling from the *Deepwater Horizon* explosion. Necropsy results from many of the stranded turtles indicate mortality due to forced submergence, which is commonly associated with fishery interactions. There is incomplete information on the impacts to sea turtle populations from the *Deepwater Horizon* explosion and oil spill and whether the individuals or populations may be susceptible to greater impacts in light of the increased stranding event or the *Deepwater Horizon* explosion, oil spill, and cleanup. Relevant data on the status of and impacts to sea turtle populations from the increased stranding event and *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion and oil spill may be difficult or impossible to discern from other factors. The NMFS to date has only released raw data on the number of strandings, and BOEM does not have the ability to investigate these strandings independently. 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 the absence of this information, BOEM's subject-matter experts have used what scientifically credible information that is available and applied it using accepted scientific methodologies. BOEM cannot rule out that unavailable or incomplete information on accidental impacts may be essential to a reasoned choice among the alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS, including in light of the increased stranding event and *Deepwater Horizon* explosion, oil spill, and cleanup. Activities that could result in an accidental spill in the CPA would be ongoing whether or not or not the CPA proposed action occurred.

Summary and Conclusion

BOEM has reexamined the analysis for sea turtles presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. No new significant information was discovered that would alter the impact conclusion for sea turtles presented in the 2012-2017 WPA/CPA Multisale EIS, although information remains incomplete or unavailable. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.14. Diamondback Terrapins

BOEM has reexamined the analysis for diamondback terrapins presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for diamondback terrapins presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of the Mississippi diamondback terrapin (*Malaclemys terrapin pileata*) and the Texas diamondback terrapin (*Malaclemys terrapin littoralis*) can be found in Chapter 4.2.1.14.1 of the 2012-2017 WPA/CPA Multisale EIS.

The major impact-producing factors resulting from the routine activities associated with the CPA proposed action that may affect the Mississippi diamondback terrapin (*Malaclemys terrapin pileata*) include beach trash and debris generated by service vessels and OCS facilities, efforts undertaken for the removal of marine debris or for beach restoration, and vessel traffic with associated habitat erosion. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on these terrapins can be found in Chapter 4.2.1.14.2 of the 2012-2017 WPA/CPA Multisale EIS.

Adverse impacts due to routine activities resulting from the CPA proposed action are possible but unlikely. Because of the greatly improved handling of waste and trash by industry and because of the annual awareness training required by the marine debris mitigations, the plastics in the ocean are decreasing and the devastating effects on offshore and coastal marine life are minimizing. The routine activities of the CPA proposed action are unlikely to have significant adverse effects on the size and recovery of any terrapin species or population in the Gulf of Mexico. Most routine OCS energy-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.

The major impact-producing factors resulting from the accidental events associated with the CPA proposed action that may affect the Mississippi diamondback terrapins (*Malaclemys terrapin pileata*) include offshore and coastal oil spills and spill-response activities. Potential impacts from a low-probability catastrophic spill are addressed in Appendix B of the 2012-2017 WPA/CPA Multisale EIS. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on these terrapins can be found in Chapter 4.2.1.14.3 of the 2012-2017 WPA/CPA Multisale EIS.

Impacts on diamondback terrapins from smaller accidental events are likely to affect individual diamondback terrapins in the spill area, but the impacts are unlikely to rise to the level of population effects (or 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 ongoing or the potential for exploration, drilling, and production activities.

The analyses in the 2012-2017 WPA/CPA Multisale EIS, including Appendix B of the 2012-2017 WPA/CPA Multisale EIS, conclude that there is a low probability for catastrophic spills; also, Appendix B of the 2012-2017 WPA/CPA Multisale EIS concludes that there is a potential for a low-probability catastrophic event to result in significant, population-level effects on affected diamondback terrapin species. BOEM continues to concur with the conclusions from these analyses.

For those terrapin populations that may not have been impacted by the *Deepwater Horizon* explosion, oil spill, and cleanup, 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. A low-probability catastrophic event of the size and type that could reach these habitats is discussed in Appendix B of the 2012-2017 WPA/CPA Multisale EIS.

The major cumulative impact-producing factors that may affect the Mississippi diamondback terrapin (*Malaclemys terrapin pileata*) include oil spills and spill-response activities, alteration and reduction of habitat, and consumption of trash and debris. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on these terrapins can be found in Chapter 4.2.1.14.4 of the 2012-2017 WPA/CPA Multisale EIS.

Diamondback terrapins have experienced impacting pressures from habitat destruction, road construction, drowning in crab traps, and past overharvesting resulting in historical reductions in their habitat range and declines in populations. Inshore oil spills from non-OCS energy-related sources are potential threats to terrapins in their brackish coastal marshes. Pipelines from offshore oil and gas and other shoreline crossings have contributed to marsh erosion. However, the CPA proposed action includes only limited shoreline crossings, and modern regulations require mitigation of wetland impacts. Low-probability catastrophic offshore oil spills could affect the coastal marsh environment but such events are rare occurrences and may not reach the shore, even if they do occur. Therefore, the incremental contribution of the CPA proposed action is expected to be minimal compared with non-OCS activities. The major impact-producing factors resulting from the cumulative activities associated with the CPA proposed action that may affect the diamondback terrapin include oil spills and spill-response activities,

alteration and reduction of habitat, and consumption of trash and debris. 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. No substantial information was found at this time that would alter the overall conclusion that cumulative impacts on diamondback terrapins associated with the CPA proposed action is expected to be minimal.

BOEM has considered this assessment and has reexamined the cumulative analysis for diamondback terrapins. Based on this evaluation, conclusions in these analyses on the effects to diamondback terrapins remain unchanged in regards to routine activities (no potential for significant adverse effects) and accidental spills (potential for significant adverse effects).

In addition, non-OCS energy-related activities (i.e., crabbing, fishing, military activities, scientific research, and shoreline development) 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 (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. Impacts on diamondback terrapins from either smaller accidental events or low-probability catastrophic events will remain the same.

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. Non-OCS energy-related activities will continue to occur in the CPA irrespective of proposed CPA Lease Sale 231 (i.e., crabbing, fishing, military activities, scientific research, and shoreline development). Therefore, the incremental effect of the CPA proposed action on diamondback terrapins 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.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Various Internet sources were examined and literature searches conducted in order to assess recent information regarding diamondback terrapins that may be pertinent to the CPA. There is photographic evidence of one terrapin found oiled on Grand Terre Isle, Louisiana, on June 8, 2010 (State of Louisiana, Coastal Protection and Restoration, 2012). It is not clear whether this terrapin was included with the two reptiles collected in the CPA, which is described on RestoreTheGulf.gov (2011). As data continue to be gathered and impact assessments completed, a better characterization of the full scope of impacts to the terrapin populations in the Gulf of Mexico from the *Deepwater Horizon* explosion, oil spill, and cleanup will be available.

BOEM concludes that there remains incomplete or unavailable information regarding diamondback terrapins that could be relevant to reasonable foreseeable significant adverse effects. This includes information that may be forthcoming regarding impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup. The OCS activities will be ongoing under existing leases, whether or not the CPA proposed action or any other alternative is selected. However, BOEM believes that the unavailable information may be essential to a reasoned choice among alternatives, particularly to the extent that diamondback terrapins were affected by the *Deepwater Horizon* explosion, oil spill, and cleanup for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. The FWS has jurisdiction for investigating terrapin impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup through the NRDA process. To date, there are no data available on impacts to terrapins from the *Deepwater Horizon* explosion, oil spill, and cleanup. BOEM is therefore unable to determine, at this point and time, what effect (if any) the *Deepwater Horizon* explosion and oil spill had on terrapins. The NRDA process may take years to complete. Impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup 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 scientific methods and approaches.

Summary and Conclusion

BOEM has reexamined the analysis for these terrapins presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. Various Internet sources were examined to assess recent information regarding this resource that may be pertinent to the CPA. No new significant information was discovered that would alter the impact conclusion for these terrapins presented in the 2012-2017 WPA/CPA Multisale EIS, although information remains incomplete or unavailable. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.15. Alabama, Choctawhatchee, St. Andrew, and Perdido Key Beach Mice

BOEM has reexamined the analysis for beach mice presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for beach mice presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of beach mice can be found in Chapter 4.2.1.15.1 of the 2012-2017 WPA/CPA Multisale EIS.

The major impact-producing factors associated with routine activities of the CPA proposed action that may affect beach mice include beach trash and debris, and efforts undertaken for the removal of marine debris or for beach restoration. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on beach mice can be found in Chapter 4.2.1.15.2 of the 2012-2017 WPA/CPA Multisale EIS.

An impact from the routine activities associated with the CPA proposed action on the Alabama, Choctawhatchee, St. Andrew, and Perdido Key beach mice is possible but unlikely. Impact 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. The BSEE prohibits the disposal of equipment, containers, and other materials into offshore waters by lessees (30 CFR 250.300; also refer to NTL 2012-BSEE-G01 "Marine Trash and Debris Awareness and Elimination"). In addition, MARPOL, Annex V, Public Law 100-220 (101 Statute 1458) prohibits the disposal of any plastics at sea or in coastal waters. Unless all personnel are adequately trained, efforts undertaken for the removal of marine debris may temporarily scare away beach mice or destroy their food resources, such as sea oats. However, their burrows are about 1-3 m (3-10 ft) long and involve a plugged escape tunnel, which would function after the main burrow entrance was trampled by foot traffic of insufficiently trained debris cleanup personnel.

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. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on beach mice can be found in Chapter 4.2.1.15.3 of the 2012-2017 WPA/CPA Multisale EIS.

The oiling of beach mice could result in local extinction. Oil-spill-response and cleanup activities could also have a substantial impact to the beach mice and their habitat if all cleanup personnel are not adequately trained. However, potential spills that could result from the CPA proposed action are not expected to contact beach mice or their habitats. The probability of contact with the shoreline next to beach mouse habitat is unlikely (mostly <0.5% probability; Figure 3-11 of the 2012-2017 WPA/CPA Multisale EIS), and the probability of oil washing over the foredunes to beach mouse habitat is even less. Also, inshore facilities related to the CPA proposed action are unlikely to be located on beach mouse habitat.

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 remaining

habitat by tropical storms and hurricanes has increased the threat of extinction of several subspecies of beach mice. Destruction of the remaining habitat due to a catastrophic spill and cleanup activities would increase the threat of extinction, but the potential for a catastrophic spill that would substantially affect beach mice habitat is low.

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 effects have a potential to harm or reduce the numbers of beach mice. The major impact-producing factors that affect beach mice include oil spills, alteration and reduction of habitat, predation (especially from domestic cats) and competition, consumption of and entanglement in beach trash and debris, beach development, coastal spills, and natural catastrophes (i.e., hurricanes and tropical storms). Most proposed action-related spills, as well as oil spills stemming from import tankering and prior and future lease sales, are not expected to contact beach mice or their habitats. Cumulative impacts could potentially deplete some beach mice populations to unsustainable levels. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on beach mice can be found in Chapter 4.2.1.15.4 of the 2012-2017 WPA/CPA Multisale EIS.

Cumulative activities have the potential to harm or reduce the numbers of Alabama, Choctawhatchee, St. Andrew, and Perdido Key beach mice. Those activities include oil spills, alteration and reduction of habitat, predation and competition, consumption of and entanglement in beach trash and debris, beach development, and natural catastrophes (hurricanes and tropical storms). 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 live above the intertidal zone where contact is less likely. Cumulative impacts could potentially deplete some beach mice populations to unsustainable levels. Impacts from OCS activities could come from trash and debris and the effort to remove them, as well as oil spills and cleanup operations. If personnel are properly trained (on short notice if under emergency conditions) and supervised, these impacts could be reduced. The expected incremental contribution of the CPA proposed action to the cumulative impacts is negligible.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

As part of the search for new information available since the publication of the 2012-2017 WPA/CPA Multisale EIS, Google Advanced Scholar Search and Google Advanced Book Search using keywords “beach mouse” and “dunes” revealed no pertinent new journal articles on beach mice and their dune habitats.

Within the historic ranges of the four Gulf Coast beach mouse subspecies, between 1851 and 2006, 58 hurricanes have made landfall in northwest Florida and 21 hurricanes have made landfall in Alabama (McAdie et al., 2009; USDOC, NOAA, National Hurricane Center, 2012). The Internet was searched for any new information. Other than the information on hurricane frequencies, no new relevant data were identified since the publication of the 2012-2017 WPA/CPA Multisale EIS.

BOEM acknowledges that there remains incomplete or unavailable information regarding beach mice, including information regarding the *Deepwater Horizon* explosion, oil spill, and cleanup and impacts from that spill to beach mice. Nevertheless, there is scientifically credible information regarding the likelihood that beach mice were minimally impacted by oil and related tarballs from the *Deepwater Horizon* explosion. There is a pending study investigating the effects of *Deepwater Horizon* explosion, oil spill, and cleanup activities on beach mice and their habitat. The ongoing research on the potential impacts from the cleanup activities to beach mice is being conducted through the NRDA process. The NRDA research projects may be years from completion, and data and conclusions have not been released to the public. Regardless of the costs involved, it is not within BOEM’s ability to obtain this information from the NRDA process within the timeline of this Supplemental EIS. In its place, BOEM has included what scientifically credible information is available and applied it using accepted scientific methodologies. Although information resulting from this study may be relevant to reasonably foreseeable adverse impacts on beach mice and their habitat, BOEM’s subject-matter experts have determined that it is not essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. BOEM has conservatively considered the potential for impacts from cleanup activities.

Summary and Conclusion

New information does not indicate a change in the conclusions identified in the 2012-2017 WPA/CPA Multisale EIS. An impact from the routine activities associated with the CPA proposed action on Alabama, Choctawhatchee, St. Andrew, and Perdido Key beach mice is possible but unlikely. Impacts on beach mice from accidental impacts that may be associated with the CPA proposed action would be minimal. The expected incremental contribution of the CPA proposed action to the cumulative impacts remains small.

No new significant information was discovered that would alter the impact conclusion for these beach mice presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.16. Coastal and Marine Birds

BOEM has reexamined the analysis for coastal and marine birds presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for coastal and marine birds presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of coastal and marine birds can be found in Chapter 4.2.1.16.1 of the 2012-2017 WPA/CPA Multisale EIS.

Major potential impact-producing factors 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 helicopter and service-vessel traffic and associated noise (Habib et al., 2007; Bayne et al., 2008);
- mortality due to exposure and intake of OCS-related contaminants, e.g., 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).

A detailed impact analysis of the routine impacts that may be associated with OCS activities associated with proposed CPA Lease Sale 231 on coastal and marine birds can be found in Chapter 4.2.1.16.2 of the 2012-2017 WPA/CPA Multisale EIS.

In general, the effects from routine activities in the CPA (**Tables 3-3, 3-4, and 3-6** of this Supplemental EIS and Tables 3-13 through 3-16 of the 2012-2017 WPA/CPA Multisale EIS) are expected to exceed those in the WPA due to differences in the number of proposed (and current) platforms, onshore infrastructure and pipeline landfalls, and the number of service support vessel and helicopter trips (Chapters 4.1.1.14.2 and 4.2.1.16.2 of the 2012-2017 WPA/CPA Multisale EIS for a comparison). The majority of the effects resulting from routine activities of the CPA proposed action on threatened or endangered (**Table 4-1**) and nonthreatened and nonendangered coastal and marine birds are expected to be sublethal, e.g., primarily disturbance-related effects. However, as has been documented by Russell (2005), collision-related mortality of trans-Gulf migrant landbirds (Lincoln et al., 1998, Figure 18; Faaborg et al., 2010, Figure 3) does occur (**Figure 4-1** of this Supplemental EIS and Figures 3-5 through 3-7 of the 2012-2017 WPA/CPA Multisale EIS); approximately 50 birds/platform or roughly

200,000 birds/year across the archipelago. Conservatively, the addition of 35-67 installed platforms would probably result in the collision death of an additional 1,750-3,350 birds/year or 70,000-134,000 over the life of newly installed platforms (Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS). Over the life of the Gulf of Mexico platform archipelago (~4,000 platforms over a 40-year period), mortality estimates may be on the order of approximately 8-13 million birds. The collision death estimates should also be considered biased low given that (1) the platform-specific estimates associated with number of anticipated installed platforms only include deaths due to collisions and (2) these estimates and the long-term estimates do not account for issues related to detection bias (Piatt et al., 1990a; Piatt and Ford, 1996; Flint et al., 1999) or lost bird years (Zafonte and Hampton, 2005). Taking this bias into account, BOEM has determined that these collision mortality estimates still represent an adverse, but not significant, impact to migrant birds. This is because it has been estimated from theoretical analyses of 1998 and 1999 radar data that there could be 147 (1999) to 316 (1998) million trans-Gulf migrants in the spring season for a given year (Russell, 2005). Although there will always be some level of incomplete information on the effects from routine activities under the CPA proposed action on birds, there is credible scientific information, applied using acceptable scientific methodologies, to support the conclusion that any realized impacts would be generally sublethal in nature and not in themselves rise to the level of reasonably foreseeable significant adverse (population-level) effects. Also, routine activities will be ongoing in the CPA proposed action area as a result of existing leases and related activities. Within the CPA, there is a long-standing and well-developed OCS Program (more than 50 years); there are no data to suggest that routine activities from the preexisting OCS Program are significantly impacting bird populations. Therefore, a full understanding of any incomplete or unavailable information on the effects of routine activities is not essential to make a reasoned choice among the alternatives. Particularly when compared with other causes of bird mortality, the routine events associated with the OCS Program are unlikely to result in population-level impacts to avian species.

Overall, impacts to avian species from routine activities are expected to be adverse but not significant. The impacts include the following:

- temporary behavioral changes, temporary or permanent changes in habitat use, temporary changes in foraging behavior, temporary changes to preferred foods or prey switching, temporary or permanent emigration, temporary or permanent reductions in nesting, hatching, and fledging success;
- sublethal, chronic effects due to exposure to or intake of OCS-related contaminants via spilled oil, pollutants in the water from service vessels, produced water, or discarded debris;
- nocturnal circulation around platforms, which may create acute sublethal stress from energy loss (and the addition of platforms will increase collision risk);
- minimal habitat impacts (based on actual acres of footprint), which are expected (onshore or within State waters) to occur directly from routine activities resulting from the CPA proposed action (but refer to Johnston et al., 2009); and
- secondary impacts from pipeline and navigation canals to coastal habitats, which will occur over the long term and may ultimately displace species to other habitats, assuming comparable (quality) habitats are available.

Presently, there are no mitigations (or stipulations) in place specific for the protection and conservation of migratory birds in the Gulf (USDOI, FWS and USDOI, MMS, 2009; Alexander, 2010). However, avoidance measures and conditions are routinely placed on permitted activities to protect habitat (Table 4-3 of the 2012-2017 WPA/CPA Multisale EIS; but also refer to Johnston et al., 2009; Johnson and St.-Laurent, 2011).

Impact-producing factors from accidents include oil spills regardless of size and oil-spill cleanup activities, including the release of rehabilitated birds. A detailed impact analysis of the accidental impacts of OCS activities associated with proposed CPA Lease Sale 231 on coastal and marine birds can be found in Chapter 4.2.1.16.3 of the 2012-2017 WPA/CPA Multisale EIS.

Overall, impacts to coastal and marine birds associated with accidental events (oil spills regardless of size) in the CPA should be greater compared with the WPA due to the following factors: greater number of platforms; higher oil-spill probabilities; and greater numbers of predicted oil spills, particularly pipeline spills, over the life of the CPA proposed action (**Tables 3-3, 3-4, and 3-6** of this Supplemental EIS and Tables 3-11, 3-12, and 3-22 of the 2012-2017 WPA/CPA Multisale EIS). In addition, avian species' diversity, abundance, and density for numerous species of beach-nesting waterbirds and coastal marshbirds appear to be greater in the CPA than in the WPA (Chapter 4.2.1.16.1 of the 2012-2017 WPA/CPA Multisale EIS; Hunter et al., 2002 and 2006; USDOI, FWS, 2010c).

Oil spills (and disturbance impacts associated with cleanup activities) have the greatest impact on coastal and marine birds. Depending on the timing and location of the spill, even small spills can result in major avian mortality events (refer to 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., 2000b; Alonso-Alvarez et al., 2007a), 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, but 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 catastrophic spill, depending on the timing, location, and size of the spill. For additional information on a catastrophic spill, refer to Appendix B of the 2012-2017 WPA/CPA Multisale EIS.

Cumulative impacts to coastal and marine birds include both OCS and non-OCS activities. The OCS activities include the following:

- the CPA proposed action; and
- prior and future OCS sales.

The non-OCS activities include the following:

- State oil and gas activity;
- crude oil imports by tankers; and
- other commercial, military, and recreational offshore and coastal activities.

The OCS-related, impact-producing factors include the following:

- air pollution;
- pollution of coastal and offshore waters resulting from OCS-related activities including platform and pipeline oil spills, produced waters, and any spill-response activities;
- structure presence and lighting;
- aircraft and vessel traffic and associated noise and disturbance impacts, including OCS helicopter and service-vessels;
- habitat loss, alteration, and fragmentation resulting from coastal facility construction and development;
- OCS pipeline landfalls; and
- trash and debris.

The non-OCS, impact-producing factors include the following:

- air pollution;
- pollution of coastal waters resulting from municipal, industrial, and agricultural runoff and discharge;
- tanker oil spills and spills related to oil and gas activities in State coastal waters and any spill-response activities;
- aircraft and military activities, including jet training overflights and sonic booms;
- nonconsumptive recreation, including bird-watching activities, all-terrain vehicle use, walking and jogging with pets, and other beach use;
- maintenance and use of navigation waterways;
- habitat loss, alteration, and fragmentation associated with commercial and residential development;
- collisions of coastal and marine birds with various anthropogenic structures (e.g., buildings, power lines, cell phone towers, etc.);
- diseases;
- climate change and related impacts;
- storms and floods;
- coastal development; and
- fisheries interactions.

A detailed impact analysis of the cumulative impacts that may be associated with proposed CPA Lease Sale 231 on coastal and marine birds can be found in Chapter 4.2.1.16.4 of the 2012-2017 WPA/CPA Multisale EIS.

Human-induced disturbance effects often tend to get overlooked or underestimated as a potential population-limiting factor for birds (Hockin et al., 1992; Newton, 1998, pages 365-369). The cumulative effect on coastal and marine birds from all sources is expected to result in changes in species composition and distribution and in a discernible (i.e., low thousands; Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS) decline in the number of birds that form localized groups or populations. Some of these changes are expected to be permanent and to stem from a net decrease in preferred habitat for all birds, and possibly impacts to and declines in the amount or quality of critical habitat for some endangered species (**Table 4-1** of this Supplemental EIS and Table 4-14 of the 2012-2017 WPA/CPA Multisale EIS). However, 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 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, and displaced birds may move to other habitats, if available.

In general, the net effect of habitat loss from oil spills, OCS 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.

Nocturnal circulation events at platforms are assumed to have mostly sublethal impacts (e.g., energetic losses due to time spent circling) on migrating bird populations. However, oil and gas platforms in the Gulf of Mexico (and associated lighting) results in collision-related mortality of 200,000-321,000 birds/year (Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS); these numbers will increase as a result of the CPA proposed action. Similarly, some unknown number of birds that stopover on platforms is preyed upon by migrating raptors (Russell, 2005). Overall, offshore oil and gas platform-

related avian mortality, though representing an additional source of mortality, represents a small fraction compared with other sources of anthropogenic mortality (Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS; also refer to Arnold and Zink, 2011). The mortality estimates related to offshore oil and gas activities are well below that for vehicles, buildings and windows, power lines, and communication towers (Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS).

The *Deepwater Horizon* explosion and associated spilled oil that made it into the nearshore and coastal environment resulted in the loss of ~7,250 birds across all Gulf of Mexico planning areas (**Table 4-2**; also refer to Table 4-8 of the 2012-2017 WPA/CPA Multisale EIS). A small, but unknown fraction of the total dead and live birds were collected in the WPA (USDOI, FWS, 2010a and 2010b). It is likely that birds were not oiled in the WPA, but additional information from the SCAT data and more detailed geospatial information for each bird recovered and its oiling state (oiled vs. unoiled) would be required to state that conclusively. In addition, spill-response activities likely exacerbated impacts, particularly for breeding birds nesting on the beaches, barrier islands, and other habitats that were intensively monitored. It is probable that impacts to the avian community in the CPA were far greater than impacts to the avian community in the WPA. The total number of birds killed by the *Deepwater Horizon* explosion, oil spill, and cleanup was likely biased low (**Table 4-2**). In addition, it will be years before a reliable, model-based estimate of mortality that accounts for detection-related issues is provided (e.g., Flint et al., 1999; also refer to Byrd et al., 2009). Presently, the best available information (e.g., Henkel et al., 2012) does not provide a complete understanding of the effects of the spilled oil or the recovery potential for the most impacted species (**Table 4-2** of this Supplemental EIS and Tables 4-8, 4-12, and 4-13 of the 2012-2017 WPA/CPA Multisale EIS).

Unavailable information on the cumulative effects to coastal and marine birds, including after the *Deepwater Horizon* explosion, oil spill, and cleanup (and thus related changes to the avian baseline in the affected environment), makes an understanding of the potential impacts from the CPA proposed action less clear. BOEM concludes that the unavailable information from these events may be relevant to foreseeable significant adverse impacts to coastal and marine birds. Nevertheless, relevant data on the status of bird populations after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze through the NRDA process, and impacts from the *Deepwater Horizon* explosion and resulting oil spill may be difficult or impossible to discern from other factors. The CPA is an active oil and gas region with ongoing (or the potential for) exploration, drilling, and production activities. Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, 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 based upon accepted methods and approaches. However, BOEM believes that this incomplete or unavailable information regarding effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on birds (refer to **Table 4-2**) would not likely be essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. Compared with non-OCS Program factors, such as habitat loss, collisions with non-OCS-related structures, disease and other anthropogenic factors, which may result in billions of bird deaths per year, the incremental effect of the CPA proposed action is particularly small. Any information obtained from the *Deepwater Horizon* explosion, oil spill, and cleanup is unlikely to be so significant as to change the relative importance of non-OCS factors to bird populations (**Table 4-2** of this Supplemental EIS and Table 4-7 of the 2012-2017 WPA/CPA Multisale EIS).

Disease is often lethal and may take millions of birds annually, but it should be considered a "naturally" occurring avian mortality factor unless the pathogen is introduced by humans (refer to Newton, 1998). Storms and floods represent natural, often major disturbances to which exposed organisms are generally adapted. An exception would be hurricane-related storm surges, which are exacerbated by coastal wetland loss in Louisiana and throughout the northern Gulf of Mexico (Costanza et al., 2008; Engle, 2011). Effects from sea-level rise may be particularly severe for many species of breeding marsh birds and shorebirds (e.g., brown pelican, sandwich tern, black skimmer, Forster's tern, laughing gull, gull-billed tern, royal tern, snowy plover, least tern, and Wilson's plover; USDOI, FWS, 2010c), as well as several species of wintering shorebirds that rely on beaches, flats, dunes, sandbars, shorelines, islands, estuaries, and other low-lying, tidally-influenced habitats in the Gulf of Mexico (Galbraith et al., 2002; North American Bird Conservation Initiative, 2010). Even a nominal rise in sea level (USDOC, NOAA, 2011a,) would inundate much of this habitat, making it unsuitable for many, if not most, of these species.

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 non-OCS Program-related factors.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

For a detailed treatment of the potential effects of impact-producing factors on coastal and marine birds associated with the CPA proposed action, refer to Chapter 4.1.1.16.2 of the 2012-2017 WPA/CPA Multisale EIS. A list of potentially impacted avian species considered herein can be found in **Table 4-2** of this Supplemental EIS and in Chapter 4.1.1.16.1 and Tables 4-9 through 4-11 of the 2012-2017 WPA/CPA Multisale EIS. The new information with regards to bird data are found in **Tables 4-1 and 4-2**. **Table 4-1** was updated with more recent data from FWS. The data and estimates reported in **Table 4-2** are corrected from Table 4-8 of the 2012-2017 WPA/CPA Multisale EIS. These were corrected with regards to an update for the dead birds collected from FWS. The end date for dead birds collected is now May 2011.

The majority of the effects resulting from routine activities of the CPA proposed action (**Tables 3-2, 3-4, and 3-5** of this Supplemental EIS and Tables 3-13 through 3-16 of the 2012-2017 WPA/CPA Multisale EIS) on threatened or endangered (**Table 4-1**) and nonthreatened and nonendangered coastal and marine birds are expected to be sublethal, e.g., primarily disturbance-related effects (Chapters 4.2.1.16.1 and 4.2.1.16.2 of the 2012-2017 WPA/CPA Multisale EIS).

Although there will always be some level of incomplete information on the effects from routine activities under the CPA proposed action on birds, there is credible scientific information, applied using acceptable scientific methodologies, to support the conclusion that any realized impacts would be generally sublethal in nature and not in themselves rise to the level of reasonably foreseeable significant adverse (population-level) effects. Also, routine activities will be ongoing in the CPA proposed action area as a result of existing leases and related activities. Within the CPA, there is a long-standing and well-developed OCS Program (more than 50 years). Therefore, a full understanding of any incomplete or unavailable information on the effects of routine activities is not essential to make a reasoned choice among the alternatives. Particularly when compared with other causes of bird mortality, the routine events associated with the OCS Program are unlikely to result in population-level impacts to avian species.

Presently, there are no mitigations (or stipulations) in place specific for the protection and conservation of migratory birds in the Gulf (USDOI, FWS and USDOI, MMS, 2009; Alexander, 2010). However, avoidance measures and conditions are routinely placed on permitted activities to protect habitat (but refer to Copeland et al., 2009; Bayne and Dale, 2011).

Unavailable information on the effects to coastal and marine birds from the *Deepwater Horizon* explosion, oil spill, and cleanup (and thus changes to the avian baseline in the affected environment) makes an understanding of the potential impacts from the CPA proposed action less clear. BOEM concludes that the unavailable information from these events may be relevant to foreseeable significant adverse impacts to coastal and marine birds. BOEM believes that this incomplete or unavailable information regarding effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on birds may be essential to a reasoned choice among alternatives, particularly for species listed as endangered or threatened, for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. Relevant data on the status of coastal and marine bird populations after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze through the NRDA process, and impacts from the *Deepwater Horizon* explosion and oil spill may be difficult or impossible to discern from other factors (refer to the review by Henkel et al., 2012). Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, 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 based upon accepted methods and approaches.

Summary and Conclusion

BOEM has reexamined the analysis for coastal and marine birds presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. At the present time, there is no way to discern if the additional levels of annual (>200,000) or long-term mortality (over the life of

newly installed platforms) for any of the affected trans-Gulf migrant species considered herein results in population-level impacts Russell (2005, Chapters 17 and 18). Given what we know about the life-history characteristics of many of these species (e.g., age at first reproduction, clutch size, nest success, etc.), the potential for major population-level impacts seems relatively low (Arnold and Zink, 2011, page 2). Various Internet sources were examined to assess recent information regarding this resource that may be pertinent to the CPA. No new significant information was discovered that would alter the impact conclusion for these coastal and marine birds presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.17. Gulf Sturgeon

BOEM has reexamined the analysis for Gulf sturgeon presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for Gulf sturgeon presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of Gulf sturgeon can be found in Chapter 4.2.1.17.1 of the 2012-2017 WPA/CPA Multisale EIS.

Potential impacts to the threatened Gulf sturgeon 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 occurs in estuarine and riverine locations along the Gulf Coast east of the Mississippi River in Louisiana to Florida. 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. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on Gulf sturgeon can be found in Chapter 4.2.1.17.2 of the 2012-2017 WPA/CPA Multisale EIS.

Potential routine impacts on Gulf sturgeon and the designated critical habitat may occur from drilling and produced-water discharges, bottom degradation of estuarine and marine water quality by nonpoint runoff from estuarine OCS-related facilities, vessel traffic, pipeline installation, and explosive removal of structures. Because of the permitted discharge limits mandated and enforced in the Federal and State regulatory process, the dilution and low toxicity of this pollution is expected to result in a negligible impact of the CPA proposed action on Gulf sturgeon. Vessel traffic would generally only pose a risk to Gulf sturgeon when the vessels are leaving and returning to port. Major navigation channels are excluded from critical habitat. Also, the Gulf sturgeon's characteristics of bottom-feeding and general avoidance of disturbance make the probability of vessel strike extremely remote. If any pipeline is installed nearshore as a result of the CPA proposed action, regulatory permit requirements governing pipeline placement and dredging, as well as recent noninvasive techniques for locating pipelines, would result in a very minimal impact to the Gulf sturgeon's critical habitat. Explosive removal of structures as a result of the CPA proposed action would occur well offshore of the Gulf sturgeon's critical habitat and the riverine, estuarine, and shallow Gulf habitats where sturgeon are generally located. There is no data indicating that sturgeons are using the deeper Gulf waters where most of the OCS activities occur. In general, the mud substrates found in the Gulf waters do not support the appropriate benthic food source for Gulf sturgeon. Due to regulations, mitigations, and the distance of routine activities from known Gulf sturgeon habitats, impacts from routine activities of the CPA proposed action would be expected to have negligible effects on Gulf sturgeon and their designated critical habitat.

Potential accidental impacts on Gulf sturgeon and the designated critical habitat may occur primarily from oil spills. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on Gulf sturgeon can be found in Chapter 4.2.1.17.3 of the 2012-2017 WPA/CPA Multisale EIS.

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 and currents would also diminish the volume of a slick. For the Louisiana waters and beaches with a higher probability of oil-spill occurrence than the surrounding areas, the Mississippi River outflow would also serve to help break up a slick that might otherwise contact the area. Spreading of the slick would reduce the oil concentrations that might impact the coastal Gulf sturgeon critical habitat.

The potential risk to sturgeon would result from either direct contact with oil spills (or the potential PAH's introduced through the spill) or, in some cases, long-term exposure to produced water. The PAH's could also reach the Gulf sturgeon through its diet of benthic invertebrates; PAH's can accumulate in invertebrates (USDOI, GS, 2012d). The likelihood of Gulf sturgeon impacts in coastal waters as a result of OCS activity is reduced by both the distance from a potential spill or production area and the concentration of contaminants that actually reach the area of sturgeon activity. Except for direct pipeline spills in the nearshore environment, the Gulf sturgeon would be at greater risk of a PAH encounter during the inland river migrations due to the industrial and farm waste introduced into these coastal rivers from the adjacent agricultural and urban land uses compared with an accidental event resulting from the CPA proposed action.

The Gulf sturgeon could be impacted by any oil spills that may result from the CPA proposed action. If there is contact with spilled oil, it could have detrimental physiological effects. In the rare event contact with oil occurs, this could cause nonlethal 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 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. For a 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.

This cumulative analysis summary considers the impacts of all past, present, and reasonably foreseeable future activities plus the contribution of the CPA proposed action that may adversely affect Gulf sturgeon within its range and critical habitat in the northern Gulf of Mexico. Specific types of impact-producing factors considered in this cumulative analysis include oil spills, dredge/channelization activities, natural catastrophes, fishing, and other factors that can result in changes to habitats. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on Gulf sturgeon can be found in Chapter 4.2.1.17.4 of the 2012-2017 WPA/CPA Multisale EIS.

The Gulf sturgeon and its critical habitat can be cumulatively impacted by activities such as oil spills, dredging, natural catastrophes, commercial fishing, and other factors that can result in changes to habitats. The effects from contact with spilled oil would be sublethal and last for less than 1 month (Berg, 2006). Currently, there is little public data to ascertain the short-term and long-term effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on the Gulf sturgeon or its critical habitat. It can be said that the critical habitat was exposed to oil and could possibly have been repeatedly exposed to oil in some cases. Until information is available on the quantity, type, and toxicity of the oil and where its spatial subsurface location is, no assessment can be made to the benthic forage base of the Gulf sturgeon. In addition, the oil underwent evaporation and was quickly emulsified and diluted at the wellhead by dispersants, which made it readily available for biodegradation. Because of the low probability of an offshore oil spill from the CPA proposed action occurring and contacting Gulf sturgeon critical habitat (≤4%; Figure 3-22 of the 2012-2017 WPA/CPA Multisale EIS), Gulf sturgeon contact with oil is expected to be minimal. The amount of oil projected to spill with a coastal spill is small, and it would have localized effects. 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 in the nearshore waters, juvenile or adult sturgeon using these areas have the ability to avoid the regulated dredging activity. Deaths of adult sturgeon are expected to occur from commercial fishing. Substantial damage to Gulf sturgeon

critical habitat is expected from inshore alteration activities and natural catastrophes. 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.

BOEM acknowledges that there remains incomplete or unavailable information on Gulf sturgeon, including potential impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup (and thus changes to the Gulf sturgeon baseline in the affected environment). This makes an understanding of the affected environment and cumulative impacts less clear. Here, BOEM concludes that the unavailable information from these events may be relevant to foreseeable significant adverse impacts to the Gulf sturgeon. Relevant data on the status of Gulf sturgeon populations after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion and oil spill may be difficult or impossible to discern from other factors. Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, 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 (including data on related fish species such as the Caspian Sea sturgeon) and applied this information based upon accepted scientific methods and approaches. Nevertheless, BOEM believes that this incomplete or unavailable information regarding the effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on Gulf sturgeon is likely not essential to a reasoned choice among alternatives when considering cumulative impacts for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. Non-OCS Program-related impacts are seen as the primary cumulative impacts on this resource, compared with the CPA proposed action, even in light of incomplete or unavailable information.

The incremental contribution of the CPA proposed action to the cumulative impacts on Gulf sturgeon is negligible. This is because the effect of contact between sale-specific oil spills and Gulf sturgeon is expected to be sublethal and usually last less than 1 month, and regulations and mitigations decrease impacts from routine events. Other non-OCS Program-related activities, including storms and anthropogenic factors on habitat, are expected to result in more cumulative impacts to this species.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search was conducted for information published on Gulf sturgeon, and various Internet sources were examined to determine any recent information regarding this species. Sources investigated include BOEM, NMFS, FWS, USGS, Florida Fish and Wildlife Conservation Commission, American Fisheries Society, State environmental agencies, and coastal universities. Other websites from scientific publication databases were checked for new information using general Internet searches based on major themes. No new significant information relevant to the above analysis was discovered since publication of the 2012-2017 WPA/CPA Multisale EIS.

BOEM acknowledges that there remains incomplete or unavailable information on Gulf sturgeon, including potential impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup (and thus changes to the Gulf sturgeon baseline in the affected environment). This makes an understanding of the affected environment and impacts from the CPA proposed action less clear. Here, BOEM concludes that the unavailable information from these events may be relevant to foreseeable significant adverse impacts to Gulf sturgeon. Nevertheless, BOEM believes that this incomplete or unavailable information regarding the effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on Gulf sturgeon may be essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. Relevant data on the status of Gulf sturgeon populations after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion and oil spill may be difficult or impossible to discern from other factors. Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, 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 (including data on related fish species such as the Caspian Sea sturgeon) and applied this information based upon accepted scientific methods and approaches.

Summary and Conclusion

BOEM has reexamined the analysis for Gulf sturgeon presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. Various Internet sources were examined to assess recent information regarding this resource that may be pertinent to the CPA. No new significant information was discovered that would alter the impact conclusion for these Gulf sturgeon presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.18. Fish Resources and Essential Fish Habitat

BOEM has reexamined the analysis for fish resources and essential fish habitat (EFH) presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of fish resources and EFH can be found in Chapter 4.2.1.18 and Appendix D of the 2012-2017 WPA/CPA Multisale EIS. Also, EFH are discussed in various sections of this document, including water quality (**Chapters 4.1.1.2 and 4.2.1.2**), wetlands (**Chapters 4.1.1.4 and 4.2.1.4**), seagrass communities (**Chapters 4.1.1.5 and 4.2.1.5**), live bottoms (**Chapter 4.2.1.6**), topographic features (**Chapters 4.1.1.6 and 4.2.1.7**), *Sargassum* communities (**Chapters 4.1.1.7 and 4.2.1.8**), chemosynthetic deepwater benthic communities (**Chapters 4.1.1.8 and 4.2.1.9**), nonchemosynthetic deepwater benthic communities (**Chapters 4.1.1.9 and 4.2.1.10**), and soft bottom benthic communities (**Chapters 4.1.1.10 and 4.2.1.11**).

Effects on fish resources and EFH from routine activities associated with the CPA proposed action could result from coastal environmental degradation, marine environmental degradation, pipeline trenching, and offshore discharges of drilling muds and produced waters. The effects from these routine activities on the different EFH's that are discussed in this Supplemental EIS are summarized in Appendix D of the 2012-2017 WPA/CPA Multisale EIS. Since the majority of fish species within the CPA are estuary dependent, coastal environmental degradation resulting from the CPA proposed action has the potential to adversely affect EFH and fish resources. The environmental deterioration and effects on EFH and fish resources result from the loss of nursery habitat and from the functional impairment of existing habitat through decreased water quality (Chambers, 1992; Stroud, 1992). A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on fish resources and EFH can be found in Chapter 4.2.1.18.2 and Appendix D of the 2012-2017 WPA/CPA Multisale EIS.

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. The impact of coastal and marine environmental degradation is expected to cause a nondetectable decrease in fish resources or EFH. Routine activities such as pipeline trenching and OCS discharge of drilling muds and produced water would cause negligible impacts that would not deleteriously affect fish resources or EFH. This is because of regulations, mitigations, and practices that reduce the undesirable effects on coastal habitats from dredging and other construction activities. Permit requirements should ensure that pipeline routes either avoid different coastal habitat types or that certain techniques are used to decrease impacts. At the expected level of impact, the resultant influence on fish resources would cause minimal changes in fish populations or EFH. That is, if there are impacts, they would be short term and localized; therefore, the impacts would only affect small portions of fish populations and selected areas of EFH. As a result, there would be little disturbance to fish resources or EFH. In deepwater areas, many of the EFH's are protected under stipulations and regulations currently set in place.

Without the mitigations in place, there could be major negative impacts to topographic features and live bottoms. However, some of the routine impact-producing factors are mitigated by BOEM through

the Topographic Feature Stipulation and the Live Bottom (Pinnacle Trend and Low Relief) Stipulations. These stipulations establish a No Activity Zone around important topographic features such as the Flower Gardens Banks reef and low-relief live bottoms, and NTL 2009-G39 and NTL 2009-G40 advise operators to avoid hard-bottom habitats that support fish populations. Much of coastal wetland loss that supports estuarine habitat and nursery grounds, on which fish stocks are dependent, is a result of inshore oil and gas extraction and not the result of offshore oil and gas leasing. Estuarine water quality degradation is largely a result of urban runoff. Offshore water quality is affected temporarily and in a limited area by the discharge of produced water and the overboard discharge of drill muds. Pipeline trenching, 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.

Additional hard-substrate habitat provided by structure installation in areas where natural hard bottom is rare will 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.

For these reasons, as well as the fact that Gulf of Mexico fish stocks have retained both diversity and biomass throughout the years of offshore development, the CPA proposed action is expected to result in a minimal decrease in fish resources and/or standing stocks or in EFH.

Accidental events associated with the CPA proposed action that could impact fish resources and EFH include blowouts and oil or chemical spills. Because subsurface blowouts, although a highly unlikely occurrence, suspend large amounts of sediment, they have the potential to adversely affect fish resources in the immediate area of the blowout.

A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on fish resources and EFH can be found in Chapter 4.2.1.18.3 of the 2012-2017 WPA/CPA Multisale EIS.

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 move away from a spill, to metabolize hydrocarbons, and to excrete both metabolites and parent compounds. Benthic EFH's would have decreased effects from oil spills because of the depths many occupy and because of the distance these low-probability spills would occur from benthic habitats (due to stipulations, NTL's, etc.). Fish populations may be impacted by an oil spill but they would be primarily affected if the oil reaches the shelf and estuarine areas because these are the most productive areas. 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, but the probability of a spill in these areas is low. Also, 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 habitats if they are oiled. Early life stages of animals are usually more sensitive to environmental stress than adults (Moore and Dwyer, 1974). 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 (Carls et al., 1999; Whitehead et al., 2011). Oil can be lethal to fish, especially in larval and egg stages, depending on the time of the year that the event happened. The extent of the impacts of the oil would depend on the properties of the oil and 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; therefore, they would affect generally only a small portion of fish populations. 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 cleanup on the CPA have been alleged, the actual effects are, at this time, largely speculative, and the total impacts are likely to be unknown for several years. 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* 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). The fish populations of the Gulf of Mexico have repeatedly proven to be

resilient to large, annually occurring areas of anoxia, major hurricanes, and oil spills. The CPA proposed action is not expected to significantly affect fish populations or EFH in the Gulf of Mexico.

Although there is incomplete or unavailable information on the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup on fish resources and EFH, BOEM has determined that it is impossible to obtain this information, regardless of cost, within the timeframe contemplated by this NEPA analysis, and it may be years before the information is available. This information is being developed through the NRDA process, data are still incoming and have not been made publicly available, and it is expected to be years before the information is available. In addition, where this incomplete information is relevant to reasonably foreseeable impacts, what scientifically credible information is available was used in its stead and applied using accepted scientific methodologies. Nevertheless, BOEM believes that this information is not essential to a reasoned choice among alternatives. The likely size of an accidental event resulting from the CPA proposed action would be small and unlikely to impact coastal and estuarine habitats where juvenile and larval stages of fish resources are predominant, and adult fish tend to avoid adverse water conditions.

This cumulative analysis summary includes effects on fish resources and EFH's of the OCS Program (the CPA proposed action and past and future OCS lease sales), State oil and gas activity, coastal development, crude oil imports by tanker, commercial and recreational fishing, and natural phenomena. An example of impact-producing factors considered in this cumulative analysis includes cumulative onshore impacts on EFH's, including wetland loss as a result of human population expansion, environmental degradation, relative sea-level rise, and natural factors (e.g., hurricane loss of wetlands). A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on fish resources and EFH can be found in Chapter 4.1.2.18.4 and Appendix D of the 2012-2017 WPA/CPA Multisale EIS.

In summary, along with the CPA proposed action, there are widespread anthropogenic and natural factors that impact EFH and fish populations in the Gulf of Mexico. Different OCS-related construction can range from onshore facilities to well-site construction activities including board roads, ring levees, and impoundments. With the number of pipelines estimated for the CPA proposed action, sediment would potentially be resuspended in localized areas. The explosive removal of structures does have a negative effect on those fish in close proximity. The OCS activities such as the emplacement of structures and of artificial reefs also have a positive effect by providing habitat and/or food for reef fishes, but their removals can be detrimental. Discharges from OCS activities such as drill mud and produced water have an incremental effect on offshore water quality. All discharges are regulated by USEPA or State agencies. Oil spills, although considered rare events, can affect offshore waters. Fish are known to actively avoid areas of oil spills as they avoid any area of adverse water quality, such as hypoxic waters (Wannamaker and Rice, 2000). The OCS-related activities that could physically destroy live bottoms (e.g., anchoring and using anchor chains) are mitigated by BOEM. The OCS factors potentially impacting fish resources in the Gulf of Mexico are federally regulated or mitigated and are small. There are many anthropogenic factors that are regulated by Federal and State agencies, and there are natural factors that cannot be regulated. Also to be considered is the variability in Gulf of Mexico fish populations due to natural factors such as spawning success and juvenile survival. Overall, the incremental contribution of the OCS effects to fish populations is small.

Inshore inputs of pollutants to estuaries from runoff and industry are also contributors to wetland loss. Canal dredging primarily accommodates commercial, residential, and recreational development. Increased population and commercial pressures on the CPA coast are also causing the expansion of ports and marinas there. The coastal waters of the CPA are expected to continue to experience nutrient enrichment, low-dissolved oxygen, and toxin and pesticide contamination, resulting in the loss of both commercial and recreational uses of the affected waters. The degradation of water quality is expected to continue due to contamination by point- and nonpoint-source discharges due to eutrophication of waterbodies, primarily due to runoff and hydrologic modifications. Resource management agencies, both State and Federal, set restrictions and permits in an effort to mitigate both 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 long-term effectiveness of these coastal restoration efforts.

Overfishing (including bycatch) has impacted some populations of Gulf of Mexico fish. 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. Limits on catch and fishing seasons are set by the GMFMC. State agencies regulate inshore fishing seasons and limits.

Naturally occurring tropical cyclones can cause damage to various EFH's. Their impacts can be onshore as with wetland loss and offshore with damaged topographic features. These storms are a continual part of the Gulf of Mexico climate.

All of these events and activities affect EFH's and fishery resources. Many anthropogenic inputs, including the CPA proposed action, are now monitored, regulated, and mitigated by the permitting agency or State. These efforts will continue in the future, and restoration of habitats could increase with better technologies. While EFH and fish resources are impacted by these many factors, the CPA proposed action would add a minimal amount to the overall cumulative effects.

Most of the Gulf of Mexico is designated as EFH and encompasses many different types of habitats and resources described in this Supplemental EIS. The extent of impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup to EFH and fish resources remains unclear at this time. This information is being developed through the NRDA process, data are still incoming and have not been made publicly available, and it is expected to be years before the information is available. In addition, where this incomplete information is relevant to reasonably foreseeable impacts, what scientifically credible information is available was used in its stead and applied using accepted scientific methodologies. Although incomplete or unavailable information may be relevant to reasonably foreseeable adverse impacts, this incomplete or unavailable information is not essential to a reasoned choice among alternatives. Compared with other impacting factors on EFH and fish resources, including those related to coastal and marine degradation, wetland loss, vessel traffic, and coastal development, the CPA proposed action is likely to result in a negligible increase in impacts to EFH and fish resources, regardless of any lingering impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

An ongoing search of Internet information sources as well as an ongoing search of scientific journals was conducted to determine the availability of recent information (including NMFS databases, GMFMC website, Science Direct, Elsevier, CSA Illumina, and JSTOR). No new significant scientific information has been identified as relevant to this analysis since the publication of the 2012-2017 WPA/CPA Multisale EIS.

The severity and the duration of the effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on the fish assemblages and fisheries of the Gulf of Mexico are largely speculative at this time. No evidence of significant impacts to fisheries populations in the Gulf of Mexico have been shown to date. It is unlikely that this information will be available within the timeframe contemplated by this NEPA analysis, even if the resources were available to undertake these studies. It is also difficult to gather reliable population information on all species, including highly migratory species, and it is difficult to distinguish between population variabilities due to the spill as opposed to population variabilities due to other naturally occurring environmental factors. Therefore, credible scientific information that is available on the impacts to the species has been applied using accepted methodologies. In any event, although this information is currently unavailable, it is not essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS, including because the fish in the area of the CPA affected by the spill are mobile and most would likely have moved away from the area immediately affected by the spill.

Nevertheless, information on the effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on fish resources and EFH is incomplete at this time and may take years to obtain and analyze. This information will be developed through the NRDA process, is not expected to be complete or released to the public for years, and will certainly not be available during the timeline of this Supplemental EIS. Regardless of cost, it is not within BOEM's ability to obtain this information from the ongoing NRDA process. This information may be relevant to reasonably foreseeable significant impacts, and BOEM cannot definitively state at the present time whether this information may be essential to a reasoned choice among alternatives. BOEM's subject-matter experts, however, have used the scientifically credible information that is available and applied it using accepted scientific methodologies.

Summary and Conclusion

BOEM has reexamined the analysis for fish resources and EFH presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. Various printed and Internet sources (including NMFS databases, GMGFMC website, Science Direct, Elsevier, CSA Illumina, and JSTOR) were examined to assess recent information regarding this resource that may be pertinent to the CPA. No new significant information was discovered that would alter the impact conclusion for the fish resources and EFH presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.19. Commercial Fisheries

BOEM has reexamined the analysis for commercial fisheries presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for commercial fisheries presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of commercial fisheries can be found in Chapter 4.2.1.19.1 of the 2012-2017 WPA/CPA Multisale EIS.

Direct effects on commercial fisheries from routine offshore activities could result from the installation of production platforms, underwater OCS obstructions including pipelines, production platform removals, seismic surveys, and the discharge of offshore waste. Offshore structures can cause space-use conflicts with commercial fishing, especially with longline fishing. Exploratory drilling rigs cause temporary interference to commercial fishing, lasting approximately 30-150 days. Major production platforms present a permanent area unavailable for fishing that includes structures and safety zones. Underwater OCS obstructions such as pipelines can cause loss of trawls and catch, as well as fishing downtime and vessel damage. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on commercial fisheries can be found in Chapter 4.2.1.19.2 of the 2012-2017 WPA/CPA Multisale EIS.

Routine activities such as seismic surveys and pipeline trenching in the CPA would cause negligible impacts and would not deleteriously affect commercial fishing activities. Because seismic surveys are temporary events, they are not expected to cause significant impacts to commercial fisheries. Operations such as production platform emplacement, underwater OCS impediments, and explosive platform removal would cause displacement of commercial fishing while operations are ongoing. These effects are localized to a small percentage of the area fished and they are temporary in nature.

Studies of drill mud and produced-water discharges from platforms show that the plume disperses rapidly in both cases and does not pose a threat to commercial fisheries. Routine activities are therefore not considered a threat to the commercial fisheries of the Gulf of Mexico.

Accidental events that would impact commercial fisheries include subsurface offshore blowouts and oil spills, both inshore and offshore. There is a small risk of spills occurring during shore-based support activities. The great majority of these would be very small. Most of these incidents would occur at or near pipeline terminals or shore bases, and they are expected to affect a highly localized area with low-level impacts. The effects of accidental events that may be associated with proposed CPA Lease Sale 231 on fish populations are described in **Chapter 4.2.1.18** of this Supplemental EIS and in Chapter 4.2.1.18.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events may have economic impacts on commercial fishermen if the event was large scale or long lasting, resulting in extensive closures such as for the *Deepwater Horizon* explosion, oil spill, and cleanup. These events are, however, rare. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on commercial fisheries can be found in Chapter 4.2.1.19.3 of the 2012-2017 WPA/CPA Multisale EIS.

Fish populations may be impacted by an oil-spill event should it occur, but they would be primarily affected if the oil reaches the productive shelf and estuarine areas. The probability of an offshore spill impacting these nearshore environments is also low, and oil would generally be volatilized or dispersed by currents in the offshore environment. The extent of the impacts of the oil would depend on the properties of the oil and the time of year of the event. Commercial fishermen are anticipated to avoid the area of a well blowout or an oil spill. Fisheries closures may result from a large spill event. These closures may have a negative effect on short-term fisheries catch and/or marketability. They may have a positive impact on annually harvested species in the longer term because there was a decrease in fishing pressure on the stocks.

The impacts of the CPA proposed action from accidental events (i.e., a well blowout or an oil spill) are anticipated to be minimal for most fish and shellfish populations because the potential for oil spills is very low, the most typical events are small and of short duration, and the effects are so localized that fish are typically able to avoid the area adversely impacted.

Specific types of impact-producing factors considered in the cumulative analysis include the following: (1) commercial fishing techniques or practices; (2) wetland loss; (3) hurricanes; (4) installation of production platforms and underwater OCS obstructions; (5) production platform removals; (6) seismic surveys; (7) petroleum spills; (8) subsurface blowouts; (9) pipeline trenching; and (10) offshore discharges of drilling mud and produced waters. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on commercial fisheries can be found in Chapter 4.2.1.19.4 of the 2012-2017 WPA/CPA Multisale EIS.

There are widespread anthropogenic and natural factors that impact fish populations in the Gulf of Mexico. Wetland loss as a result commercial and residential development is one of the major factors in this trend, although this is regulated and mitigated by COE. The loss of wetland nutrient inputs into estuaries that form nurseries for many species and the loss of marsh and seagrass habitats that provides shelter for larvae and juveniles of many species is a major problem, particularly in the CPA. The loss of wetlands also contributes to the intrusion of saltwater into oyster-producing waters. This increases oyster mortality by increasing disease and predators in the oyster beds.

Inshore inputs of pollutants to estuaries from runoff and industry are also contributors to wetland loss. Resource management agencies, both State and Federal, set restrictions and permits in an effort to mitigate the effects of development projects, i.e., 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 long-term feasibility of these coastal restoration efforts.

Overfishing (including bycatch) has contributed in a large way to the decline of some populations of Gulf of Mexico fish. 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. Limits on catch and fishing seasons are set by the Gulf Coast Fisheries Management Council. State agencies regulate inshore fishing seasons and limits.

The OCS activities that may affect fish populations include a small contribution to wetland loss as a result of offshore traffic traversing inland canals. There is also a contribution from oil-related activities to inland waters and estuaries. Discharges from OCS activities such as drill mud and produced water have an incremental effect on offshore water quality. All discharges are regulated by USEPA or State agencies.

Oil spills, although considered a rare event, can affect offshore waters. Adult fish are known to actively avoid areas of oil spills as they avoid any area of adverse water quality. The OCS factors can physically destroy live bottoms with anchors and anchor chains. These actions are mitigated by BOEM. The explosive removal of structures does have a negative effect on those fish in close proximity. The OCS activities such as the emplacement of structures and artificial reefs also have a positive effect by providing habitat and/or food for reef fishes.

The impacts of a catastrophic oil spill, such as the *Deepwater Horizon* explosion recently experienced in the Gulf of Mexico, based on limited data now available, are discussed in Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Unavailable information on the effects to commercial fisheries from the *Deepwater Horizon* explosion, oil spill, and cleanup (and thus changes to the commercial fisheries baseline in the affected environment section) makes an understanding of the cumulative effects less clear. Here, BOEM concludes that the unavailable information from these events may be relevant to foreseeable significant adverse impacts to the commercial fishing industry and commercially important fish resources. Relevant data on the status of commercially important fish populations and the commercial fishing

industry after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion and oil spill may be difficult or impossible to discern from other factors. Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, 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, BOEM believes that incomplete or unavailable information regarding the effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on the commercial fishing industry is not essential to a reasoned choice among alternatives in the cumulative effects analysis for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. The expected incremental effect of the CPA proposed action remains small when viewed in light of other historic, ongoing, and reasonably foreseeable future factors impacting commercial fisheries, such as fishing pressures, habitat loss, and hurricanes.

The OCS factors potentially impacting fish resources in the Gulf of Mexico are federally regulated or mitigated and are small. There are many anthropogenic factors that are regulated by Federal and State agencies, and there are natural factors that cannot be regulated. Also to be considered is the variability in Gulf of Mexico fish populations due to natural factors such as spawning success and juvenile survival.

Overall, the commercial fish and shellfish populations have remained healthy in the Gulf of Mexico in spite of the OCS activities. In recent years, since 2005, the major contributors to the lower fisheries catches in the Gulf of Mexico have been hurricanes (Katrina, Rita, Gustav, and Ike), fisheries closures and freshwater diversions due to the *Deepwater Horizon* explosion, oil spill, and cleanup in 2010 and the Mississippi River flooding in 2011. Compared with non-OCS activities (such as commercial fishing practices, wetland loss, and hurricanes), the incremental effect of the CPA proposed action is not expected to be significant.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of Internet information sources resulted in the NOAA news release regarding the 2011 menhaden catch (USDOC, NMFS, 2012f). Menhaden was a species of concern during the *Deepwater Horizon* explosion, oil spill, and cleanup because they are a very large cash crop in the Gulf of Mexico and they are surface feeders, as noted in Chapter 4.2.1.19 of the 2012-2017 WPA/CPA Multisale EIS. It was also noted in the 2012-2017 WPA/CPA Multisale EIS, however, that the dispersant was added to the oil release at the seafloor to prevent large surface slicks.

Since the publication of the 2012-2017 WPA/CPA Multisale EIS, new commercial fisheries values for the year 2011 became available. These numbers are included here. All commercial fisheries data referenced in this section were obtained from NMFS (USDOC, NMFS, 2012d).

The Gulf of Mexico provided 40 percent, 33 percent, and 42 percent of the number of pounds of seafood landed in the United States (with the exception of Alaska) in the years 2009, 2010, and 2011, respectively. This amounted to approximately 25 percent, 22 percent, and 24 percent of the dollar value of the total catch for each of these respective years in the United States, again excluding Alaska.

Menhaden (*Brevoortia patronus*), with landings of over 1.6 billion pounds and valued at over $110 million, was the most important Gulf species in terms of quantity landed during 2011. The catch was up approximately 65 percent from 2010, when the catch was approximately 967 thousand pounds valued at $66 million. Menhaden are harvested extensively for their oil, which is included in animal food and human supplements as Omega-3 fatty acid. This species is harvested primarily in Louisiana and Mississippi.

Commercial shellfish of most importance to the central Gulf Coast include shrimp (primarily brown and white, *Farfantepenaeus aztecus* and *Litopenaeus setiferus*), blue crabs (*Callinectes sapidus*), and Eastern oyster (*Crassostera virginica*). The 2010 harvest of white shrimp from the central and eastern Gulf Coast States was 89 million pounds (85% of the U.S. harvest). The 2011 harvest of white shrimp for the central and eastern Gulf Coast States was nearly 63 million pounds (~62% of the U.S. harvest). The 2010 and 2011 harvests of brown shrimp for the same area were approximately 25 million pounds and 58 million pounds (31% and 46% of the U.S. harvest), respectively. Blue crab harvest in the three central Gulf Coast States was approximately 37.7 million pounds in 2010, which is 20 percent of the total U.S. harvest for that year. In 2011, blue crab harvest in these states was nearly 53 million pounds, which is approximately 27 percent of the entire harvest of the U.S. Eastern oyster harvest in 2010 from the central

and eastern Gulf Coast States totaled 10.6 million pounds. The 2011 harvest for the central and eastern Gulf States was approximately 14 million pounds or approximately 67 percent of the entire U.S harvest.

The 2010 total fisheries landings in Louisiana were approximately 1 billion pounds valued at approximately $248 million. Total Louisiana fisheries landings in 2011 were over 1.5 billion pounds valued at slightly over $340 million. Louisiana landings in 2010 and 2011 were dominated by menhaden. Shellfish catch was dominated by white shrimp, blue crab, and brown shrimp.

Total Mississippi fisheries catch in 2010 decreased to 111 million pounds ($21.9 million), a 52 percent decrease over the 2009 catch. Total Mississippi fisheries catch in 2011 was approximately 278 million pounds, approximately 2.5 times the amount caught in 2010, worth approximately $30.3 million. Total fisheries landings in Mississippi in 2010 and 2011 were dominated by the menhaden fishery. Shellfish harvest was dominated by brown shrimp and white shrimp in 2009, 2010, and 2011.

The 2010 total catch in Alabama was 14.6 million pounds valued at approximately $27.7 million. Catch values from 2011 show a total of slightly over 26 million pounds valued at approximately $51 million. Finfish catch in Alabama has been dominated by striped mullet (*Mugil cephalus*) in recent years. In 2010 the striped mullet catch was 1.1 million pounds valued at $560 thousand. In 2011, the striped mullet catch was 1.2 million pounds valued at approximately $675 thousand. Shellfish harvested in Alabama, in decreasing order of pounds harvested in 2010 and 2011, were brown shrimp, white shrimp, and blue crabs.

Total fisheries harvest from the west coast of Florida from 2010 was approximately 62 million pounds value at about $137.6 million. Values from 2011 were 77.6 million pounds valued at nearly $164 million. Striped mullet constituted the largest catch in pounds, with 7.1 million pounds in 2010 and 11.3 million pounds in 2011; however, red grouper (*Epinephelus morio*) was the most valuable finfish catch at $9 million in 2010 and $15.1 million in 2011. Shellfish harvested from the west coast of Florida in 2010 and 2011 included Caribbean spiny lobster (*Panulirus argus*), blue crabs, pink shrimp (*Farfantepenaeus duorarum*), and the Eastern oyster.

Hurricane Isaac passed over southeastern Louisiana in August 2012. The effects of the hurricane on fisheries are, at present, unknown. Hurricane Isaac did, however, result in an official Louisiana Department of Wildlife and Fisheries' commercial fisheries closure stretching from Caminada Pass to Belle Pass and a mile offshore (Louisiana Department of Wildlife and Fisheries, 2012) due to a tar mat associated with the *Deepwater Horizon* oil spill, which washed up on the beach of Elmer's Island. As of November 1, 2012, this area remains closed.

Stock Status

The NMFS reports each year to Congress and the Fishery Management Councils on the status of all fish stocks in the Nation. As of the 2011 status report (USDOC, NMFS, 2012e), overfished species in the Gulf of Mexico are red snapper, greater amberjack, gag grouper, and gray triggerfish. Although the report has been updated, there have been no changes in the species considered overfished in the Gulf of Mexico.

A search of the referenced literature revealed a study of blue fin tuna larvae (Muhling et al., 2012), also a species of concern during the *Deepwater Horizon* explosion, oil spill, and cleanup. The Atlantic stock of blue fin tuna, a highly prized commercial species, spawn in the Gulf of Mexico in early summer. This study found, however, by using satellite-derived estimates of oil coverage and spawning habitat models, that less than 10 percent of the blue fin tuna spawning habitat was predicted to have been covered by surface oil and that less than 12 percent of larval blue fin tuna were predicted to have been located within contaminated waters in the northern Gulf on a weekly basis. This study model is preliminary evidence that the larval mortality as a result of the *Deepwater Horizon* explosion, oil spill, and cleanup was not a catastrophic event for the 2010 year class of the population of Atlantic blue fin tuna.

The impacts of a catastrophic oil spill, such as the *Deepwater Horizon* explosion recently experienced in the Gulf of Mexico, based on limited data now available, are discussed in Appendix B of the 2012-2017 WPA/CPA Multisale EIS. Unavailable information on the effects to commercial fisheries from the *Deepwater Horizon* explosion, oil spill, and cleanup (and thus changes to the commercial fisheries baseline) makes an understanding of the cumulative effects less clear. BOEM concludes that the unavailable information from these events may be relevant to foreseeable significant adverse impacts to the commercial fishing industry and commercially important fish resources. Relevant data on the status of commercially important fish populations and the commercial fishing industry after the *Deepwater*

Horizon explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion and oil spill may be difficult or impossible to discern from other factors. Therefore, it is not possible for BOEM to obtain this information within the timeframe contemplated by this NEPA analysis, 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, BOEM believes that incomplete or unavailable information regarding the effects of the *Deepwater Horizon* explosion, oil spill, and cleanup on the commercial fishing industry is not essential to a reasoned choice among alternatives in the effects analysis for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

BOEM has reexamined the analysis for commercial fisheries presented in the 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 commercial fisheries presented in the 2012-2017 WPA/CPA Multisale EIS. While there were increases to commercial fisheries catches in 2011 as compared with 2010, there is still uncertainty to what degree the fisheries closures in 2010 affected stocks. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.20. Recreational Fishing

BOEM has reexamined the analysis for recreational fishing presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for recreational fishing presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of recreational fishing can be found in Chapter 4.2.1.20.1 of the 2012-2017 WPA/CPA Multisale EIS.

Routine OCS actions can affect recreational fishing activity in a number of ways. The most direct impacts of OCS actions occur through their impacts on the fish populations that support recreational fishing activity. Many of the species fished by recreational anglers are the same as those caught by commercial fishermen. The main exception is menhaden, which is primarily a commercially fished species. The OCS activities can cause coastal environmental degradation either through effects on water quality or on wetland habitats. Construction operations and vessel traffic could also cause some degree of space-use conflict with recreational fishing vessels. Since the majority of recreational fishing activity in the Gulf of Mexico occurs fairly close to shore, space-use conflicts would primarily arise near onshore ports (primarily during the construction phase). However, even if a space-use conflict was to arise in a particular instance, it is likely that a number of substitute recreational fishing sites would be available. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on recreational fishing can be found in Chapter 4.2.1.20.2 of the 2012-2017 WPA/CPA Multisale EIS.

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 (Chapter 4.2.1.18.2 of the 2012-2017 WPA/CPA Multisale EIS), which would also negatively impact recreational fishing activity. However, these minor negative effects would likely be offset by the beneficial role that oil rigs serve as artificial reefs for fish populations. The degree to which oil platforms would become a part of a particular State's Rigs-to-Reefs program would be an important determinant of the degree to which the CPA proposed action would impact recreational fishing activity in the long term.

The most direct manner in which oil spills and other accidental events would impact recreational fishing activity would be through their effects on fish and their habitats in the affected areas. A spill could either contaminate fish in the immediate area or cause fish to move during the duration of the spill. A spill would likely cause more direct harm to larvae and eggs than adults, which could possibly affect recreational species in the longer term. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on recreational fishing can be found in Chapter 4.2.1.20.3 of the 2012-2017 WPA/CPA Multisale EIS.

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. A large spill such as the one associated with the *Deepwater Horizon* explosion can have more substantial effects due to the larger potential closure regions and due to the wider economic implications such closures can have. Public perceptions of fish contamination would also play a more important role subsequent to a large oil spill. However, the longer-term implications of a large oil spill would primarily depend on the extent to which fish ecosystems recover after the spill has been cleaned.

There remains incomplete or unavailable information that may be relevant to reasonably foreseeable impacts on recreational fishing. Much of this information relates to the *Deepwater Horizon* explosion, oil spill, and cleanup and is continuing to be collected and developed through the NRDA process. These data collection and research projects may be years from completion. Few data or conclusions have been released to the public to date. Regardless of the costs involved, it is not within BOEM's ability to obtain this information from the NRDA process within the timeline of this Supplemental EIS. In light of this incomplete and unavailable information, BOEM's subject-matter experts have used credible scientific information that is available and applied it using scientifically accepted methodology. Given the available data that have been released, as described in this section, BOEM believes that this incomplete or unavailable information is not essential to a reasoned choice among alternatives in the effects analysis, for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS.

The cumulative impacts to recreational fishing activity will arise from the CPA proposed action, the existing OCS Program, and the expected progression of the recreational fishing industry in the Gulf of Mexico. These impacts would arise from the cumulative effects on fish resources in the Gulf of Mexico. Cumulative impacts include wetland loss, marine/estuary water quality degradation, damage to live bottoms, structure removals, petroleum spills, subsurface blowouts, pipeline trenching, and discharges of drilling mud and processed waters on fish resources. Because many of the recreationally sought fishes are also harvested commercially, a number of the cumulative impacts to the recreational fishing industry are similar to those of the commercial fishing industry. This is true even though recreational fishing is primarily confined to smaller, closer inshore areas of the Gulf of Mexico than commercial fishing. The cumulative impacts unique to recreational fishing activity would arise from State and Federal fisheries management plans, the role of oil platforms as artificial reefs, and the lingering impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on recreational fishing can be found in Chapter 4.2.1.20.4 of the 2012-2017 WPA/CPA Multisale EIS.

The CPA proposed action and the broader OCS Program have varied effects on recreational fishing activity. The OCS Program has generally enhanced recreational fishing opportunities due to the role of oil platforms as artificial reefs. This effect depends importantly on the extent to which rigs are removed at decommissioning or are maintained through Rigs-to-Reefs programs. However, oil spills can have negative consequences on recreational fishing activity due to the resultant fishing closures, the public perception that fish and shellfish are contaminated, and the longer-term effects that oil spills can have on fish populations. This was evident during the *Deepwater Horizon* explosion, oil spill, and cleanup, the effects of which are not yet certain. However, this type of catastrophic spill event is rare. The contribution of the CPA proposed action to these positive and negative cumulative effects would be minimal because of the relatively small amount of activity expected with the CPA proposed action. In addition, 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.

New Information Available Since the 2012-2017 WPA/CPA Multisale 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. The primary new data source is an annual update to recreational fishing data for the Gulf of Mexico (USDOC, NMFS, 2012g). This update provides updates to the preliminary 2011 data that were used in the 2012-2017 WPA/CPA 2012-2017 WPA/CPA Multisale EIS. In 2012, NMFS also updated its data for previous years. This data source provides data on both the species caught and the amount of angler effort in any particular year. **Table 4-29** presents data on the number of angler trips taken in each state in the Gulf of Mexico in 2009, 2010, and 2011. In the Gulf as a whole, there were 22.6 million angler trips in 2009, 21.0 million angler trips in 2010, and 22.6 million angler trips in 2011. Thus, while there was a decrease in recreational fishing activity in 2010, overall recreational fishing activity in 2011 returned to the same level as that which occurred in 2009. **Table 4-29** also breaks down these trips by location and mode. The three geographic locations for each state are inland, State ocean waters, and Federal ocean waters. The three modes of fishing are shore fishing, charter fishing, and private/rental fishing. Ocean-based recreational fishing activity was still lower in 2011 than in 2009; however, this was offset by an increase in recreational fishing activity closer to shore. Recreational fishing activity was higher in 2011 than in 2009 in Alabama, Louisiana, and Mississippi, while recreational fishing activity in West Florida was lower in 2011 than in 2009. **Table 4-30** presents data on the most commonly landed species by recreational fishermen in Louisiana, Mississippi, Alabama, and Florida during each year from 2007 through 2011. In general, the catch data for 2011 seem consistent with the effort data for 2011. Namely, there was an increase in catch levels for a number of inland-based species such as Atlantic croaker, sand seatrout, and sheepshead. However, there were somewhat lower catch levels for some ocean-based species (such as red snapper and king mackerel) during 2010 and 2011.

There remains incomplete or unavailable information that may be relevant to reasonably foreseeable impacts on recreational fishing. Much of this information relates to the *Deepwater Horizon* explosion, oil spill, and cleanup and is continuing to be collected and developed through the NRDA process. These data collection and research projects may be years from completion. Few data or conclusions have been released to the public to date. Regardless of the costs involved, it is not within BOEM's ability to obtain this information from the NRDA process within the timeline of this Supplemental EIS. In light of this incomplete and unavailable information, BOEM's subject-matter experts have used credible scientific information that is available and applied it using scientifically accepted methodology. Given the available data that have been released, as described in this section, BOEM believes that this incomplete or unavailable information is not essential to a reasoned choice among alternatives in the effects analysis for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

BOEM has reexamined the analysis for recreational fishing presented in the 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 recreational fishing presented in the 2012-2017 WPA/CPA Multisale EIS. This is because the updated recreational fishing data for Louisiana, Mississippi, Alabama, and Florida were roughly in line with prior expectations. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.21. Recreational Resources

BOEM has reexamined the analysis for recreational resources presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for recreational resources presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the

resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of recreational resources can be found in Chapter 4.2.1.21.1 of the 2012-2017 WPA/CPA Multisale EIS.

Routine OCS oil and gas activities can affect recreation and tourism in diverse ways. The OCS activities can have direct negative impacts on beach and coastal recreational resources through discharges of marine debris, noise, and visual impairments. There are also possible indirect impacts on local recreational resources from space-use conflicts and from increased economic activity from OCS operations. The unique role that oil platforms can play as artificial reefs should also be accounted for when considering policy actions. Finally, the possible effects of public perceptions on tourism, particularly in light of the *Deepwater Horizon* explosion, oil spill, and cleanup, should be considered. However, while impacts on recreational resources from routine OCS activities can occur from a number of sources, in total they are likely to be reasonably small in scale. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on recreational resources can be found in Chapter 4.2.1.21.2 of the 2012-2017 WPA/CPA Multisale EIS.

The recreational resources most vulnerable to an oil spill are the beaches and nature parks along the Gulf Coast. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on recreational resources can be found in Chapter 4.2.1.21.3 of the 2012-2017 WPA/CPA Multisale EIS.

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, these effects are also likely to be small in scale and of short duration. In the unlikely event that a spill occurs that is sufficiently large enough to affect large areas of the coast and, through public perception, has effects that reach beyond the damaged area, the effects to recreation and tourism could be substantial, at least in the short term.

The cumulative impacts to recreational resources would occur through the CPA proposed action, the existing OCS Program, and from the expected impacts of external events and actions to recreational resources and tourism activity. The CPA proposed action would contribute to a number of aesthetic and space-use issues arising from existing oil and gas programs. The OCS activities can also impact the recreational uses of beaches and wetland areas, which are already being impacted through coastal erosion. Finally, lingering impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup would contribute to the incremental impacts of an oil spill, should one arise from the CPA proposed action. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on recreational resources can be found in Chapter 4.2.1.21.4 of the 2012-2017 WPA/CPA Multisale EIS.

The CPA proposed action would contribute to the aesthetic impacts and the space-use conflicts that arise due to the broader OCS Program. Oil spills could also contribute to the overall degradation of beach and wetland-based recreational resources. The dynamics of any future oil spill will also be influenced by the damage done and lessons learned from the *Deepwater Horizon* explosion, oil spill, and cleanup. However, the cumulative impacts of the CPA proposed action on recreational resources are small since the incremental increase in the probability of a large spill is also low. The incremental contribution of the CPA proposed action is expected to be minimal, in light of all non-OCS-related activities such as aesthetic impacts (including from other industrial sources), wetland loss, and space-use conflicts.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of information sources (such as Internet articles and known economic data providers) was conducted to determine the availability of recent information related to recreational resources. The primary new information source is updated data from the U.S. Department of Labor, Bureau of Labor Statistics (2012) regarding the levels of employment in recreational industries in geographic areas along the Gulf Coast. **Table 4-5** presents annual data on the level of employees in recreational industries from 2008 through 2011. As can be seen, recreational employment was higher in December 2011 than in December 2009 in all 13 EIA's along the Gulf Coast. These data provide further confirmation that, in aggregate, the recreational industries along the Gulf Coast have mostly recovered from the *Deepwater Horizon* explosion, oil spill, and cleanup. However, the impacts of the oil spill resulting from the *Deepwater Horizon* explosion, oil spill, and cleanup are difficult to disentangle from the impacts of

overall economic conditions. The high unemployment that persists nationwide has likely had a particular impact on tourism activity since people are more likely to cut back on recreation than other more basic necessities.

The Draft General Management Plan for the Gulf Islands National Seashore (USDOI, National Park Service, 2011) provides information to consider with respect to the impacts of the OCS Program on the Gulf Islands National Seashore. For example, Horn and Petit Bois Islands were designated as having wilderness status in 1978 through the establishment of the Gulf Islands Wilderness Area. This status reflects the pristine, undeveloped nature of the area, which is highly valued by recreational visitors to the area. This also implies that recreational visitors to this area may be particularly sensitive to disruptions to recreational experiences arising from the visibility of OCS platforms, to any marine debris that could arise from OCS activities, to noise arising from helicopters or other vessels, and to the damage and disruptions that would arise from an oil spill. In January 2013, BOEM convened a meeting with the National Park Service to continue ongoing coordination efforts and to determine if any mitigation measures can and should be implemented for lease sales in the area adjacent to the Gulf Islands National Seashore. During the discussions, the National Park Service did not provide any documentation that would change the conclusions in the analyses in this Supplemental EIS.

As shown in **Table 4-5**, there were 27,719 jobs in the leisure/hospitality industry in EIA MS-1, which comprises seven counties in coastal Mississippi. While the Gulf Islands National Seashore is an important driver of coastal Mississippi's economy, it is difficult to quantify the extent to which these various jobs are dependent on the Gulf Islands National Seashore.

Bounds (2012) provides additional information to consider regarding the impacts of oil and gas activities on tourism. First, this study provides additional information regarding the impact of elevation on the visibility of oil and gas infrastructure. For example, this study estimates that, from an elevation of 13 ft (4 m), which would be representative of some important tourism destinations in Mississippi, a typical drilling rig would be visible 13.9 mi (22.4 km) away. This study also points out some of the negative impacts drilling in Alabama State waters had on tourism on Dauphin Island.

Summary and Conclusion

BOEM has reexamined the analysis for recreational resources presented in the 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 recreational resources presented in the 2012-2017 WPA/CPA Multisale EIS. This is because the new data on recreational employment was roughly in line with prior expectations. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.22. Archaeological Resources

4.2.1.22.1. Historic

BOEM has reexamined the analysis for historic archaeological resources presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of historic archaeological resources can be found in Chapter 4.2.1.22.1.1 of the 2012-2017 WPA/CPA Multisale EIS.

Routine impact-producing factors associated with the CPA proposed action that could affect 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, pipeline emplacement, dredging of new channels, maintenance dredging of existing channels, anchoring activities, pipeline installation, structure removals and site clearance, and the masking of archaeological resources

from industry-related debris. A detailed impact analysis of the routine impacts from OCS activities associated with proposed CPA Lease Sale 231 on historic archaeological resources can be found in Chapter 4.2.1.22.1.2 of the 2012-2017 WPA/CPA Multisale EIS.

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 (i.e., platform installation, drilling rig emplacement, dredging, and pipeline emplacement) and a historic site. Archaeological surveys, where required prior to an operator beginning oil and gas 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 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 notify BSEE's Regional Director of the discovery of any potential archaeological resources.

Offshore oil and gas activities resulting from the CPA proposed action could impact an archaeological resource because of incomplete knowledge on the location of these sites in the Gulf. The risk of contact to archaeological resources is greater in instances where archaeological survey data are unavailable. Such an event could result in the disturbance or destruction of important archaeological information. Archaeological surveys, where required, would provide the necessary information to develop avoidance strategies that would reduce the potential for impacts on archaeological resources.

Except for the projected 0-1 new gas processing facilities and 0-1 new pipeline landfalls, 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 a historic archaeological resource could occur as a result of an accidental spill. A major effect from an oil-spill impact would be visual contamination of a historic coastal site, such as a historic fort or lighthouse. Although such effects may be temporary and reversible, cleaning oil from historic structures is by no means a simple or inexpensive process (e.g., Chin and Church, 2010). A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on historic archaeological resources can be found in Chapter 4.2.1.22.1.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events producing oil spills may threaten archaeological resources along the Gulf Coast. Should a spill contact a historic archaeological site, damage might include direct impact from oil-spill cleanup equipment, contamination of materials, and/or looting. Previously unrecorded sites could be impacted by oil-spill cleanup operations on beaches and offshore. It is not very likely for an oil spill to occur and contact submerged, coastal or barrier island historic sites as a result of the CPA proposed action.

The major effect from an oil-spill impact would be visual contamination of a historic coastal site, such as a historic fort or lighthouse. 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. It is expected that any spill cleanup operations would be considered a Federal action for the purposes of Section 106 of the National Historic Preservation Act and would be conducted in such a way as to cause little or no impacts to historic archaeological resources. Recent research suggests that the impact of direct contact of oil on historic properties may be long term and not easily reversible without risking damage to fragile historic materials (Chin and Church, 2010).

The potential for spills is low, the effects would generally be localized, and the cleanup efforts would be regulated. The CPA proposed action, therefore, is not expected to result in impacts to historic archaeological sites; however, should such an impact occur, unique or significant archaeological information could be lost and this impact could be irreversible.

Of the cumulative scenario activities, those that could potentially impact historic archaeological resources include the following: (1) the OCS Program; (2) State oil and gas activity; (3) maintenance dredging; (4) OCS sand borrowing; (5) artificial rigs-to-reef development; (6) offshore LNG projects; (7) renewable energy and alternative use conversions; (8) commercial fishing; (9) sport diving and commercial treasure hunting; and (10) hurricanes. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on historic archaeological resources can be found in Chapter 4.2.1.22.1.4 of the 2012-2017 WPA/CPA Multisale EIS.

Several impact-producing factors may threaten historic archaeological resources, all related to bottom-disturbing activities. An impact could result from contact between a historic shipwreck located on the OCS and OCS Program or State oil and gas activities (i.e., pipeline and platform installations, drilling rig emplacement and operation, dredging, anchoring activities, structure removal, and site clearance). Bottom-disturbing activities on the OCS also include maintenance dredging, sand borrowing, transported artificial reef emplacement, liquefied natural gas facility construction, and renewable energy facility construction. With the exception of maintenance dredging, preconstruction surveys may be required by BOEM or the permitting agency. Impacts resulting from the imperfect knowledge of the location of historic resources may still occur in areas where a high-resolution survey is only required at 984-ft (300-m) survey intervals or not at all. The OCS development prior to requiring archaeological surveys has been documented to have impacted wrecks containing significant or unique historic information. This was amply demonstrated when a pipeline was laid across a previously unknown early 19th-century shipwreck and when an MODU mooring anchor chain cut a shipwreck in half (Atauz et al., 2006; Church and Warren, 2008). The archaeological resources regulation at 30 CFR 250.194(c) and 30 CFR 550.194 grants authority in certain cases to each BOEM and BSEE Regional Director to require archaeological reports to be submitted with the EP, DOCD, or DPP where deemed necessary. As part of the environmental reviews conducted for postlease activities, available information will be evaluated regarding the potential presence of archaeological resources within the CPA proposed action area to determine if additional archaeological resource surveys and mitigation are warranted.

The loss or discard of steel debris associated with oil and gas exploration and development and trawling activities could result in the masking of historic shipwrecks or the identification of false negatives on archaeological surveys (an anomaly that does not appear to be of historical significance, but actually is).

Damage to or loss of significant or unique historic archaeological information from commercial fisheries (trawling) is highly likely in water depths <600 ft (183 m) (Foley, 2010). It is expected that maintenance dredging, commercial bottom trawling, sport-diving and commercial treasure hunting, and hurricanes and tropical storms have impacted and would continue to impact historic period shipwrecks on the shelf where such activities occur.

Development onshore as a result of the CPA proposed action could result in the direct physical contact between a historic site and pipeline trenching. It is assumed that archaeological investigations prior to construction would serve to mitigate these potential impacts. The expected effects of oil spills on historic coastal resources are temporary and reversible.

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 of the past within the cumulative activity area, it is reasonable to assume that most impacts would have occurred prior to 1973 (the date of initial archaeological survey and site-clearance 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 report, 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 imbedded 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 (i.e., rig emplacement, pipeline trenching, anchoring, and other ancillary activities) and a historic shipwreck. The incremental contribution of the CPA proposed action is expected to be very small due to the efficacy of the remote-sensing surveys and archaeological reports, where required.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

A search of Internet information sources, as well as interviews with Larry Murphy, Historic Properties Specialist Officer for the Section 106 response to the *Deepwater Horizon* explosion, oil spill, and cleanup, and Dan Odess, DOI Consulting Archaeologist, were conducted to determine the availability of recent information. 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 EBSCO Online (http://web.ebscohost.com), JSTOR (http://www.jstor.org/), the National Technical Information Service's National Technical Reports Library (https://ntrlr3.ntis.gov), and ScienceDirect (http://www.sciencedirect.com/). The search revealed a recent interim report describing activities to support response activities related to the *Deepwater Horizon* explosion, oil spill, and cleanup and to evaluate the impact or potential impact of the event and subsequent cleanup operations to previously recorded and unidentified cultural resources. This cultural resources undertaking involves both Federal and State undertakings within the States of Louisiana, Mississippi, Alabama, and Florida. The cultural resources investigation for the *Deepwater Horizon* explosion, oil spill, and cleanup was managed as a component of the SCAT process, and archaeologists have been involved throughout the SCAT process. Cultural resources investigations utilized a combination of pedestrian surveys, shovel testing, auger test sampling, and trench sampling. In addition, archaeological and Tribal monitors have been embedded with all cleanup operations. This report summarizes the findings of the pre-field investigations, field surveys, and cleanup monitoring associated with the response to the *Deepwater Horizon* explosion and oil spill up until March 31, 2011 (HDR, 2011).

In April 2012, BOEM, working with NOAA's Office of Ocean Exploration and Research from the research vessel *Okeanos Explorer*, investigated a sonar target reported by Shell Oil in over 4,000 ft (1,200 m) of water in an area of the CPA almost 200 miles (320 km) offshore where archaeological survey had previously not been required. The target proved to be the intact remains of an armed sailing ship dating from around 1800 to 1840. This discovery highlights situations where site-specific surveys prior to bottom-disturbing activities may mitigate potential impacts.

This important discovery lends credence to BOEM's efforts to acquire survey of bottom-disturbing activities throughout the CPA.

Although there is incomplete or unavailable information on reasonably foreseeable impacts to historic archaeological resources, BOEM feels that this information is not essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. The locations of many archaeological resources remain unknown, some resources are heavily sedimented or buried and therefore protected from many impacts, and archaeological surveys, where required, are expected to be highly effective in identifying resources to allow for protection of the resource during oil and gas activities. Nevertheless, this incomplete or unavailable information is not likely to be available within the timeframe contemplated by this NEPA analysis. Hundreds of known historic archaeological resources are scattered throughout the Gulf of Mexico and thousands more may exist, but their locations are unknown to date. The costs of a Gulfwide study would be exorbitant, and it could take years before data confirming the presence of additional historic archaeological resources and the status of each could be compiled and analyzed. In place of this incomplete or unavailable information, BOEM's subject-matter experts have included what credible scientific information is available and applied it using accepted scientific methodologies as noted herein and in the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

BOEM has reexamined the analysis for historic archaeological resources presented in the 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 historic archaeological resources presented in the 2012-2017 WPA/CPA Multisale EIS because the only new relevant documentation describes the survey procedures undertaken by SCAT teams and a summation of site discoveries. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.22.2. Prehistoric

BOEM has reexamined the analysis for prehistoric archaeological resources presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of prehistoric archaeological resources can be found in Chapter 4.2.1.22.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

Offshore development as a result of the CPA proposed action could result in an interaction between a drilling rig, platform, pipeline, dredging activity, or anchors and an inundated prehistoric site. 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 contacts for North America, Central America, South America, and the Caribbean. A detailed impact analysis of the routine impacts of OCS activities that may be associated with proposed CPA Lease Sale 231 on prehistoric archaeological resources can be found in Chapter 4.2.1.22.2.2 of the 2012-2017 WPA/CPA Multisale EIS.

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 (i.e., platform installation, drilling rig emplacement, dredging, pipeline emplacement) and a prehistoric site. Prehistoric archaeological sites are thought potentially 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. The 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 possible archaeological sites. The NTL 2005-G07 suggests a 300-m (984-ft) linespacing for remote-sensing surveys of leases within areas having a high potential for prehistoric 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 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.

Oil spills resulting from a well blowout in the CPA and related spill-response activities have the potential to impact cultural resources near the spill site and landfall areas. A detailed impact analysis of the accidental impacts OCS activities that may be associated with proposed CPA Lease Sale 231 on prehistoric archaeological resources can be found in Chapter 4.2.1.22.2.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events producing oil spills may threaten archaeological resources along the Gulf Coast. 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. Previously unrecorded sites could be impacted by oil-spill cleanup operations on beaches. Detailed risk analyses of offshore oil spills ranging from ≥1,000 bbl, <1,000 bbl, and coastal spills that may be associated with the CPA proposed action is provided in Chapters 3.2.1.1, 3.2.1.2, and 3.2.1.3 of the 2012-2017 WPA/CPA Multisale EIS, respectively. 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.

Several impact-producing factors may threaten prehistoric archaeological resources of the Gulf of Mexico. An impact could result from contact between proposed oil and gas activities (including pipeline construction, platform installation, drilling rig emplacement and operation, dredging, and anchoring activities) and an oil spill and subsequent cleanup efforts. Each of these activities or events could damage and destroy a prehistoric archaeological site located on the continental shelf. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on prehistoric archaeological resources can be found in Chapter 4.2.1.22.2.4 of the 2012-2017 WPA/CPA Multisale EIS.

Archaeological surveys, where required, and the resulting archaeological analyses completed prior to an operator beginning oil and gas activities on a lease are expected to be highly effective at identifying possible prehistoric sites. The OCS development prior to the first required archaeological survey in 1973 has possibly impacted sites containing significant or unique prehistoric information, and it is possible that, even with current survey methods, prehistoric archaeological sites may be missed. No significant new information was found at this time that would alter the overall conclusion that cumulative impacts on prehistoric archaeological sites associated with the CPA proposed action is expected to be minimal.

Because of continued regulations and surveys, where required, the potential impact from the CPA proposed action to prehistoric archeological resources would be decreased.

Should an oil spill occur and contact a coastal prehistoric site, loss of significant or unique information could result. Oil spills have the potential to impact coastal prehistoric sites directly or indirectly by physical impacts caused by oil-spill cleanup operations.

The initial dredging of ports and navigation channels and tropical storms are assumed to have caused the localized loss of significant or unique archaeological information.

Onshore development as a result of the OCS Program could result in the direct physical contact between a prehistoric site and new facility construction and pipeline trenching. It is assumed that archaeological investigations prior to construction would serve to mitigate these potential impacts.

The shallow depth of sediment disturbance caused by commercial fisheries activities (trawling) is not expected to exceed that portion of the sediments that have been disturbed by wave-generated forces.

The effects of the various impact-producing factors discussed in this 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 would have occurred prior to 1973 (the date of initial archaeological survey and clearance requirements). 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 the 2012-2017 WPA/CPA Multisale EIS

A search of Internet information sources, as well as interviews with Larry Murphy, Historic Properties Specialist Officer for the Section 106 response to the *Deepwater Horizon* explosion, oil spill, and cleanup, and Dan Odess, DOI Consulting Archaeologist, were conducted to determine the availability of recent information. 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 EBSCO Online (http://web.ebscohost.com), JSTOR (http://www.jstor.org/), the National Technical Information Service's National Technical Reports Library (https://ntrlr3.ntis.gov), and ScienceDirect (http://www.sciencedirect.com/). The search revealed a recent interim report describing activities to support response activities related to the *Deepwater Horizon* explosion and oil spill and to evaluate the impact or potential impact of the event and subsequent cleanup operations to previously recorded and unidentified cultural resources. This cultural resources undertaking involves both Federal and State undertakings within the States of Louisiana, Mississippi, Alabama, and Florida. The cultural resources investigation for the *Deepwater Horizon* explosion, oil spill, and cleanup was managed as a component of the SCAT process, and archaeologists have been involved throughout the SCAT process. Cultural resources investigations utilized a combination of pedestrian surveys, shovel testing, auger test sampling, and trench sampling. In addition, archaeological and Tribal monitors have been embedded with all cleanup operations. This report summarizes the findings of the pre-field investigations, field surveys, and cleanup monitoring associated with the response to the *Deepwater Horizon* explosion and oil spill, up until March 31, 2011 (HDR, 2011).

Although there is incomplete or unavailable information on reasonably foreseeable impacts to prehistoric archaeological resources, BOEM feels that this information is not essential to a reasoned choice among alternatives for the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. The location of many prehistoric archaeological resources remain unknown, and those that have been identified are subject to Federal and State protections. Nevertheless, this incomplete or unavailable information is not likely to be available within the timeframe contemplated by this NEPA analysis. There are numerous prehistoric archaeological resources scattered throughout the Gulf Coast and more may exist, but their locations and conditions are unknown to date. The costs of a Gulfwide study would be exorbitant and it could take years before data confirming the presence of additional prehistoric archaeological resources and the status of each could be compiled and analyzed. In place of this incomplete or unavailable information, BOEM's subject-matter experts have included what credibly scientific information is available and applied it using accepted scientific methodologies.

Summary and Conclusion

BOEM has reexamined the analysis for prehistoric archaeological resources presented in the 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 prehistoric archaeological resources presented in the 2012-2017 WPA/CPA Multisale EIS because the only new relevant document describes the survey procedures undertaken by SCAT teams and a summation of site discoveries. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.23. Human Resources and Land Use

4.2.1.23.1. Land Use and Coastal Infrastructure

BOEM has reexamined the analysis for land use and coastal infrastructure presented in the 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of land use and coastal infrastructure can be found in Chapter 4.2.1.23.1.1 of the 2012-2017 WPA/CPA Multisale EIS.

Impact-producing factors associated with the CPA proposed action that could affect land use and coastal infrastructure include gas processing facilities, pipeline landfalls, service bases, navigation channels, and waste disposal facilities. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on land use and coastal infrastructure can be found in Chapter 4.2.1.23.1.2 of the 2012-2017 WPA/CPA Multisale EIS.

The impacts of routine events associated with the CPA proposed action are uncertain due to the post-*Deepwater Horizon* environment, the effects of the drilling suspension, the changes in Federal requirements for drilling safety, and the current pace of permit approvals. BOEM projects 0-1 new gas processing facilities and 0-1 new pipeline landfalls for the CPA proposed action. However, based on the most current information available, there is only a very slim chance that either would result from the CPA proposed action, and if a new gas processing facility or pipeline landfall were to result, it would likely occur toward the end of the 40-year analysis period. The likelihood of a new gas processing facility or pipeline landfall is much closer to zero than to one (Dismukes, official communication, 2011). BOEM anticipates that there would be maintenance dredging of navigation channels and an increase in activity at services bases as a result of the CPA proposed action. If drilling activity recovers post-*Deepwater Horizon* and increases, there could be new increased demand for a waste disposal services as a result of the CPA proposed action. Because of the current near zero estimates for a pipeline landfall and gas processing facility construction, the routine activities associated with the CPA proposed action would have little effect on land use.

As a result of the *Deepwater Horizon* explosion, oil spill, and cleanup, it is too early to determine substantial, long-term changes in routine event impacts to land use and infrastructure. BOEM anticipates these changes would become apparent over time. Therefore, BOEM recognizes the need to continue monitoring all resources for changes that are applicable for land use and infrastructure. In regard to land use and infrastructure, it does not appear that there would be adverse impacts from routine events associated with the CPA proposed action.

Accidental events (impact-producing factors) associated with the CPA proposed action that could affect land use and coastal infrastructure include oil spills, vessel collisions, and chemical/drilling-fluid spills. The *Deepwater Horizon* explosion was an accidental event of historic and catastrophic proportion, the largest blowout in U.S. history, and the first to occur on the OCS in over 30 years. Such events should be distinguished from accidental events that are smaller in scale and that occur more frequently. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale

231 on land use and coastal infrastructure can be found in Chapter 4.2.1.23.1.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events associated with the CPA proposed action would occur at different levels of severity, based in part on the location and size of event. The typical types of accidental events that could affect land use and coastal infrastructure include oil spills, vessel collisions, and chemical/drilling-fluid spills. These may occur anywhere across the spectrum of severity. Typically, accidental events related to OCS activities are generally smaller in scale based on historic experience, and they must be distinguished from low-probability catastrophic events such as the *Deepwater Horizon* explosion and oil spill. Typically, the impact of small-scale oil spills, vessel collisions, and chemical/drilling fluid spills are not likely to last long enough to adversely affect overall land use or coastal infrastructure in the analysis area.

Many of the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup to land use and infrastructure have been temporary and short term, such as the ship decontamination sites and the waste staging areas established in the immediate aftermath of the *Deepwater Horizon* explosion, oil spill, and cleanup (USDOT, Bureau of Transportation Statistics, 2010). The indirect effects on infrastructure use are still rippling through the industry, but this should resolve as issues with the suspensions, rate of permitting, and other matters are resolved. With regards to land use and infrastructure, the post-*Deepwater Horizon* environment remains somewhat dynamic, and BOEM will continue to monitor these resources over time and to document short- and long-term *Deepwater Horizon* explosion, oil spill, and cleanup impacts. In the future, the long-term impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup will be clearer as time allows the production of peer-reviewed research and targeted studies that determine those impacts. The *Deepwater Horizon* explosion and oil spill was a low-probability catastrophic event. The kinds of accidental events that are likely to result from the CPA proposed action are not likely to significantly affect land use and coastal infrastructure. This is because accidental events offshore would have a small probability of impacting onshore resources. Also, if an accident occurs nearshore, it would most probably be near a facility; therefore, the impacts would be temporary and localized because of the decrease in response time.

The cumulative analysis considers both existing land-use patterns and the effects of impact-producing factors from OCS and State oil and gas activities. A detailed impact analysis of cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on land use and coastal infrastructure can be found in Chapter 4.2.1.23.1.4 of the 2012-2017 WPA/CPA Multisale EIS.

For the CPA proposed action, the primary region of geographic influence is coastal Texas, Louisiana, Mississippi, and Alabama. Land-use patterns vary greatly by region, reflecting differences in soils, climate, topography, and patterns of population settlement. Mississippi and Louisiana are located in what the U.S. Department of Agriculture's Economic Research Service calls the Delta farm production region, while Alabama is located in the Southeast farm production region and Texas is located in the Southern Plain region (Lubowski, 2006). The Economic Research Service conducts land-use inventories based on available land-use data obtained from surveys conducted both by the ERS and its predecessor agencies.

This analysis focuses only on those Gulf Coast States that could be impacted by the CPA proposed action, i.e., Alabama, Mississippi, Louisiana, and Texas. 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, which includes cropland harvested, crop failure, cultivated summer fallow, cropland used only for pasture, and idle 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. For all four coastal states, 42 percent of the total land area is used for grassland pasture and range, with Texas devoting 61 percent of close to 262,000 mi^2 (679,095 km^2) for grassland pasture and range. Forest land, which the U.S. Forest Service defines as land at least 10 percent stocked by trees of any size, including land that formerly had such tree cover and that will be naturally or artificially regenerated, makes up 28 percent of the total land area in these four coastal states. Alabama has the most forest use land with 70 percent of the State's 53,868 mi^2 (139,517 km^2) covered in forest, followed by Mississippi with 65 percent of its total land area covered in forest. Forest use land includes timberland, reserved forest land, but it excludes forest land in parks, wildlife areas, and similar special purpose uses. Special use areas, which include areas in highway, road, and railroad rights-of-way and airports; Federal and State parks, wilderness areas, and wildlife refuges; and national defense and industrial areas, make up 4 percent of the total land area for these four coastal states. Louisiana has the highest percentage of special use area with 7 percent of the land used for special-use purposes (Lubowski, 2006).

Census urban areas include densely populated areas with at least 50,000 people ("urbanized areas") and densely populated areas with 2,500-50,000 people ("urban clusters"). Included in the Census urban area definition are residential areas and concentrations of nonresidential urban areas such as commercial, industrial, and institutional land; office areas; urban streets and roads; major airports; urban parks and recreational areas; and other land within urban defined areas. The total urban land area for all four states is just 3 percent of the total land area, with Louisiana and Alabama tied for the highest percentage of urban areas with 4 percent of each state being utilized for high population areas. The final land use category, "Miscellaneous," includes industrial and commercial sites in rural areas, cemeteries, golf courses, mining areas, quarry sites, marshes, swamps, sand dunes, bare rocks, deserts, tundra, rural residential, and other unclassified land. For Alabama, Mississippi, and Texas, 4 percent of land use is classified as miscellaneous, but in Louisiana, 16 percent of land use is classified as miscellaneous. Louisiana contains 40-45 percent of the wetlands found in the lower states within its 195,000-mi^2 (505,048-km^2) footprint (USDOI, GS, 2012a). Louisiana also has the greatest rate of landloss in the Nation. For a more detailed discussion on deltaic landloss, refer to **Chapter 4.1.1.4**.

The OCS-related demands upon coastal infrastructure and land use tend to be geographically concentrated as compared with historic residential settlement within the region. For instance, Port Fourchon is the service base for over 90 percent of OCS deepwater production and serves as a conduit for 15-18 percent of the Nation's entire oil supply (The Greater Lafourche Port Commission, 2011). As one of the most significant footprints within the OCS-related infrastructure corridor, Port Fourchon comprises only 2.7 developed square miles (7 km^2)within a close to 44,000-mi^2 (113,959-km^2) state. In Louisiana, there are 105 persons per square mile, and in Lafourche Parish (where Port Fourchon is located), there are 90 persons per square mile, both above the national average of 87 persons per square mile (USDOC, Census Bureau, 2010). The future of non-OCS-related land use and infrastructure will largely be determined by economic drivers that influence where people settle or relocate.

Activities relating to the OCS Program and State oil and gas production are expected to minimally affect the current land use of the analysis area because most subareas have strong industrial bases and designated industrial parks to accommodate future growth in oil and gas businesses. BOEM projects 0-1 new gas processing facilities and 0-1 new pipeline landfalls for the CPA proposed action, although this is a conservative estimate and the number is much closer to zero than to one. If a new gas processing facility or pipeline landfall were to occur, it would likely be toward the end of the 40-year analysis period (Dismukes, official communication 2011). There may be a new increased demand for waste disposal services as a result of the CPA proposed action. 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. However, in the cumulative case it is possible that Port Fourchon expansions may eventually be constrained by surrounding wetlands. Based on the available information and current BOEM scenario projections, the cumulative impacts on land use and coastal infrastructure from OCS-related activities are expected to be minor. Therefore, the incremental contribution of the CPA proposed action to the cumulative impacts on land use and coastal infrastructure are also expected to be minor.

The coastal infrastructure supporting the CPA proposed action represents only a tiny portion of the coastal land and infrastructure throughout the CPA and Gulf of Mexico, and little change is expected to occur due to changing agricultural and extractive (e.g., lumbering, petroleum) uses of onshore land. Many non-OCS-related factors contribute substantially to the cumulative impacts to land use and coastal infrastructure, including housing and other residential developments; the development of private and publically 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; and changes in non-OCS-related demands for water transportation systems and ports. Given the overwhelming contribution of these non-OCS-related factors to the cumulative impacts on land use and coastal infrastructure and the small incremental contribution of the CPA proposed action, the cumulative impacts on land use and coastal infrastructure are also expected to be minor.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Additional research was conducted to investigate the availability of recent information affecting land use and coastal infrastructure since publication of the 2012-2017 WPA/CPA Multisale EIS. Various

Internet sources were examined, including the websites of numerous Federal and State agencies (U.S. Department of Homeland Security, Federal Emergency Management Agency; U.S. Department of Commerce, 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 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, TOLLROADS News, and *The Energy Journal*. This research revealed Sasol, Inc.'s plan to build a gas-to-liquids processing facility in Calcasieu Parish, Louisiana. This would be the first gas-to-liquids facility constructed in the United States. Plans call for an 18-month feasibility study to consider two development options, specifically, whether it will produce 2 million tons per year or 4 million tons per year (Troy, 2011). At present, BOEM believes that most of this gas will be sourced from onshore unconventional reserves rather than from OCS supplies. BOEM will continue to monitor future development of this new coastal infrastructure category (gas-to-liquids facilities), but this one proposed plan would not be expected to on its own represent a significant development or change in land use.

Summary and Conclusion

BOEM has reexamined the analysis for land use and coastal infrastructure presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented above. BOEM has determined that the additional information does not alter the impact conclusion for land use and coastal infrastructure because the plans to build the new gas-to-liquids facility are very preliminary and are dependent upon not only the outcome of the 18-month feasibility study but also future fluctuations in the natural gas supply market. Therefore, the analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.23.2. Demographics

BOEM has reexamined the analysis for demographics presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for demographics presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of demographics can be found in Chapter 4.2.1.23.2.1 of the 2012-2017 WPA/CPA Multisale EIS.

The addition of any new human activity, such as oil and gas development resulting from the CPA proposed action, can affect local communities in a variety of ways. Typically, these effects are in the form of people and money, which can translate into changes in the local social and economic institutions. Minor demographic changes, primarily in focus areas, are projected as a result of the CPA proposed action. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on demographics can be found in Chapter 4.2.1.23.2.2 of the 2012-2017 WPA/CPA Multisale EIS.

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 the total population) for any EIA in the Gulf of Mexico region. The baseline population patterns and distributions, as projected and described in Chapter 4.2.1.23.2.1 of the 2012-2017 WPA/CPA Multisale EIS, are expected to remain unchanged as a result of the CPA proposed action. The increase in employment is

expected to be met primarily with the existing population and available labor force, with the exception of some in-migration projected to occur in focal areas, such as Port Fourchon.

The addition of human activity associated with an oil-spill response can affect local communities in a variety of ways. Typically, these effects are short term and in the form of a temporary influx of people and money, which can translate into changes in the local social and economic institutions. Minor to no demographic changes, primarily in projected shoreline contact areas, are projected as a result of the CPA proposed action. Detailed impact analyses of the routine, accidental, and cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on demographics can be found in Chapter 4.2.1.23.2.3 of the 2012-2017 WPA/CPA Multisale EIS.

Accidental events associated with the CPA proposed action, such as oil or chemical spills, blowouts, and vessel collisions, would likely have no effects on the demographic characteristics of the Gulf coastal communities 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 and because net employment impacts from a spill are not expected to exceed 1 percent of baseline employment for any EIA in any given year.

The cumulative analysis considers the effects of OCS-related, impact-producing factors as well as non-OCS-related factors on demographics. The OCS-related factors consist of population and employment from prior, current, and future OCS lease sales. Non-OCS factors include fluctuations in workforce, net migration, relative income, oil and gas activity in State waters, and offshore LNG activity. Not considered in this analysis are the unexpected events that may influence oil and gas activity within the analysis area that cannot be predicted with reasonable accuracy. Examples of unexpected events include oil embargos and acts or war or terrorism. A detailed impact analysis of the cumulative impacts that may be associated with proposed CPA Lease Sale 231 on demographics can be found in Chapter 4.2.1.23.2.4 of the 2012-2017 WPA/CPA Multisale EIS.

The cumulative activities are projected to minimally affect the analysis area's demography. Baseline patterns and distributions of these factors, as described in Chapter 4.2.1.23.2.1 of the 2012-2017 WPA/CPA Multisale EIS, are not expected to change for the analysis area as a whole. Lafourche Parish (EIA LA-3), including Port Fourchon, and Lafayette Parish (EIA LA-2) in Louisiana are projected to experience noteworthy impacts to population as a result of an increase in demand for OCS labor from the 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 EIA's, in comparison to other factors influencing population growth, such as the status of the overall economy, fluctuations in workforce, net migration, 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 pattern would continue through the analysis period.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

BOEM conducted a search of Internet resources and known data sources related to demographics. The primary source of new information related to demographics is Woods & Poole Economics, Inc. (2011), which is an annual update to the data that were used in the 2012-2017 WPA/CPA Multisale EIS. Woods & Poole Economics, Inc. (2011) provides projections of economic and demographic variables at the county level. **Table 4-6** provides projections of the evolution of the total population in all EIA's in future years, while **Table 4-7** provides projections of the evolution of total employment in the same areas. These projections assume the continuation of existing social, economic, and technological trends at the time of the forecast. In 2011, the total Gulf Coast population was 24.85 million. In 2011, the EIA's with the largest populations were TX-3 (6.32 million), FL-4 (6.26 million), and FL-3 (3.69 million). The EIA's with the smallest populations were LA-1 (349,090), MS-1 (484,980), and LA-2 (591,720). For all EIA's combined, it is expected that the total population will grow at a 1.2 percent rate between 2011 and 2051. The fastest population growth is expected in TX-3 (1.5%) and TX-1 (1.5%); the slowest population growth is expected in LA-4 (0.5%) and MS-1 (0.6%). **Tables 4-8 through 4-20** provide projections of employment, income, wealth, business patterns, and racial composition for individual EIA's. In general, the projections of these variables have not changed noticeably from the projections in the 2012-2017 WPA/CPA Multisale EIS.

As discussed in **Chapter 4.2.1.23.3**, BOEM has incorporated a new version of MAG-PLAN into its decisionmaking process. The MAG-PLAN is an input-output model that BOEM uses to estimate the

employment and economic demand generated by OCS lease sales and to allocate this demand to onshore EIA's along the Gulf Coast. **Table 4-31** presents the expected impacts to population from the CPA proposed based on MAG-PLAN's employment estimates, while **Table 4-22** presents the expected impacts to population for the cumulative scenario. The changes in these estimates correspond closely to the changes in the employment estimates discussed in **Chapter 4.2.1.23.3**. However, the changes to these estimates from the 2012-2017 WPA/CPA Multisale EIS are modest and thus do not change the associated impact conclusions.

Summary and Conclusion

BOEM has reexamined the analysis for demographics presented in the 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 demographics presented in the 2012-2017 WPA/CPA Multisale EIS. This is because the updated MAG-PLAN output still suggests that the impacts of the CPA proposed action on demographics would be relatively small. In addition, the new Woods & Poole Economic, Inc.'s (2011) data were roughly in line with prior expectations. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.23.3. Economic Factors

BOEM has reexamined the analysis for economic factors presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for economic factors presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of economic factors can be found in Chapter 4.1.1.23.3 of the 2012-2017 WPA/CPA Multisale EIS.

The CPA proposed action would have economic impacts on a variety of firms along the OCS industry's supply chain. For example, the CPA proposed action would directly affect firms that are responsible for well drilling, equipment manufacturing, pipeline construction, and servicing OCS activities. The OCS activities would also impact the suppliers to those firms, as well as firms that depend on consumer spending of oil and gas industry workers. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on economic factors can be found in Chapter 4.1.1.23.3.2 of the 2012-2017 WPA/CPA Multisale EIS.

Should the CPA proposed action occur, there would be only minor economic changes in the Texas, Louisiana, Mississippi, Alabama, and Florida EIA's. This is because the demand would be met primarily with the existing population and labor force. Most of the employment related to the CPA proposed action is expected to occur in Texas (primarily in the EIA TX-3) and in the coastal areas of Louisiana. The CPA proposed action, irrespective of whether one analyzes the high-case or low-case production scenario, would not cause employment effects >0.5 percent in any EIA along the Gulf Coast.

An oil spill can have a number of effects on local economies. The most direct effects are felt in industries that depend on resources that are damaged or rendered unusable for a period of time due to a spill. For example, beach recreation, recreational fishing, and commercial fishing would be vulnerable if beach or fish resources were damaged due to an oil spill. However, for small to medium oil spills, the impacts to these activities would likely be localized and small in scale. An oil spill could also have noticeable economic impacts if it were to impact important transportation routes or affect the operations of certain port facilities. However, the likelihood of a single oil spill shutting down an entire waterway or port facility is quite low. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on economic factors can be found in Chapter 4.2.1.23.3.3 of the 2012-2017 WPA/CPA Multisale EIS.

An oil spill can cause a number of disruptions to local economies. A number of these effects are due to industries that depend on damaged resources. However, the impacts of an oil spill can be somewhat broader if firms further along industry supply chains are affected. These effects depend on issues such as the effects of cleanup operations and the responses of policymakers to a spill. However, the impacts of small- to medium-sized spills should be localized and temporary. A catastrophic spill along the lines of the one resulting from the *Deepwater Horizon* explosion would have more noticeable impacts to the economy. However, the likelihood of another spill of this scale is quite low.

The CPA proposed action would contribute to the economic effects of the broader OCS Program. The OCS Program directly affects firms that are responsible for well drilling, equipment manufacturing, pipeline construction, and servicing OCS activities. The OCS activities also impact the suppliers to those firms, as well as firms that depend on consumer spending of oil and gas industry workers. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on economic factors can be found in Chapter 4.2.1.23.3.4 of the 2012-2017 WPA/CPA Multisale EIS.

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 industry in upcoming years. The expected path of the overall economy is projected using the data provided by Woods & Poole Economics, Inc. (2010). The expected economic impacts of the OCS 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. A detailed impact analysis of the cumulative impacts of proposed CPA Lease Sale 231 on economic factors can be found in Chapter 4.2.1.23.3.4 of the 2012-2017 WPA/CPA Multisale EIS.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

BOEM conducted a search of Internet resources and known data sources related to economic factors. The primary new information source that has become available is a revised version of MAG-PLAN. The MAG-PLAN is an input-output model that BOEM uses to estimate the employment and economic demand generated by OCS lease sales and to allocate this demand to onshore EIA's along the Gulf Coast. The updated version of MAG-PLAN incorporates an improved method for estimating the economic impacts of the spending of workers in the OCS industry. BOEM has also incorporated a methodology in which the employment impacts of lease sales are distributed to onshore areas more similarly for CPA and WPA lease sales. BOEM is continuing to review methods for distributing the impacts of lease sales among EIA's and for differentiating the impacts of CPA and WPA lease sales.

Tables 4-32 through 4-34 present the revised MAG-PLAN estimates of the employment impacts of the CPA proposed action, while **Tables 4-23 through 4-25** present the revised estimates of the cumulative impacts of all OCS activities. **Table 4-34** shows that the estimated peak employment impacts of the CPA proposed action will primarily occur in the following EIA's (the number of jobs in the low and high scenarios, respectively, are presented in parenthesis): TX-3 (3,710; 6,824); LA-3 (848; 1,862); LA-2 (644; 1,428); and TX-1 (551; 1,577). These updated employment estimates reflect a modest increase from the estimates of the 2012-2017 Multisale EIS for Texas EIA's and a modest decrease for Louisiana EIA's. These updated estimates also bring BOEM's results more in line with the findings of Quest Offshore (2011), which incorporates proprietary OCS supply chain data into its input-output model to create various measures of the economic impacts of the Gulf OCS Program.

Recent information shows that permitting and exploration activities in the Gulf increased in pace in 2012 (compared with 2010 and 2011). Eighty-nine deepwater permits were issued in 2012 (by October 2012); this compares with 76 permits in 2009, 32 permits in 2010, and 38 permits in 2011 (Klimasinska, 2012). As of December 2012, 16 of 18 drillships and 17 of 31 semisubmersibles were actively drilling in the Gulf (Rigzone, 2012). IHS Petrodata's Jackup Day Rate Index for the Gulf of Mexico increased from 296 in November 2011 to 388 in November 2012, while jackup utilization increased from 52 percent to 63 percent over the same time period (IHS.com, 2012). Other anecdotal evidence suggests that Gulf exploration and development activity picked up noticeably in 2012 (Greenberg, 2012).

Information regarding the number of blocks leased and the bids received in previous lease sales is presented in "Outer Continental Shelf Lease Sale Statistics" (USDOI, BOEM, 2012d). A discussion of the procedures that BOEM uses to ensure the Federal Government receives proper returns from lease sales can be found in "Summary of Procedures for Determining Bid Adequacy at Offshore Oil and Gas

Lease Sales: Effective July 1999, with Sale 174" (USDOI, MM,S 1999). Agalliu (2011) presents a comparative analysis of the GOM fiscal system relative to fiscal systems in other countries. This study creates a composite measure of government return and shows that the fiscal systems for the shelf and deepwater areas of the Gulf of Mexico rank favorably relative to fiscal systems in other countries. An economic analysis of the costs and benefits of leasing in the Gulf of Mexico is presented in Section 2.12 of the 2012-2017 Programmatic EIS (USDOI, BOEM, 2012c). This analysis found that the benefits of leasing in both the WPA and CPA continued to exceed the costs. More information regarding BOEM's economic analyses can be found in the economic analysis methodology for the Five-Year Program (USDOI, BOEM, 2012e).

Summary and Conclusion

BOEM has reexamined the analysis for economic factors presented in the 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 economic factors presented in the 2012-2017 WPA/CPA Multisale EIS. This is because the updated MAG-PLAN output still suggests that the impacts of the CPA proposed action on employment would be relatively small. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.23.4. Environmental Justice

BOEM has reexamined the analysis for environmental justice presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented below. No new significant information was discovered that would alter the impact conclusion for environmental justice presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of environmental justice can be found in Chapter 4.2.1.23.4.1 of the 2012-2017 WPA/CPA Multisale EIS.

Impact-producing factors potentially resulting from routine events associated with the CPA proposed action that could affect environmental justice include the following: (1) potential infrastructure changes/expansions including fabrication yards, support bases, and onshore disposal sites for offshore waste; (2) increased commuter and truck traffic; and (3) employment changes and immigration. A detailed impact analysis of the routine impacts of OCS activities associated with proposed CPA Lease Sale 231 on environmental justice can be found in Chapter 4.2.1.23.4.2 of the 2012-2017 WPA/CPA Multisale EIS.

Because of the existing extensive and widespread support system for OCS-related industry and the associated labor force, the effects of routine events related to the CPA proposed action are expected to be widely distributed and to have little impact. This is because the CPA proposed action is not expected to significantly change most of the existing conditions, such as traffic or the amount of infrastructure. Where such change might occur is impossible to predict but, in any case, it would be very limited. Because of Louisiana's extensive oil-related support system, that State is likely to experience more employment effects related to the CPA proposed action than are the other coastal states, and because of the concentration of this system in Lafourche Parish, that parish is likely to experience the greatest benefits from employment benefits and burdens from traffic and infrastructure demand. Impacts related to the CPA proposed action on minority and low-income populations are expected to be primarily economic in nature and to have a limited but positive effect on low-income and minority populations because the CPA proposed action would contribute to the sustainability of current industry and related support services. Given the existing distribution of the industry and the limited concentrations of minority and low-income peoples adjacent to the OCS infrastructure (Chapter 4.2.1.23.4 of the 2012-2017 WPA/CPA Multisale EIS), the CPA proposed action is not expected to have a disproportionate effect on these populations, even in Lafourche Parish.

The CPA proposed action is not expected to have disproportionate high/adverse environmental or health effects on minority or low-income people.

Impact-producing factors associated with the CPA proposed action that could affect environmental justice include oil spills, vessel collisions, and chemical/drilling-fluid spills. These factors could affect environmental justice through (1) direct exposure to oil, dispersants, degreasers, and other chemicals that can affect human health; (2) decreased access to natural resources due to environmental damages, fisheries closures, or wildlife contamination; and (3) proximity to onshore disposal sites used in support of oil and chemical spill cleanup efforts. A detailed impact analysis of the accidental impacts that may be associated with proposed CPA Lease Sale 231 on environmental justice can be found in Chapter 4.2.1.23.4.3 of the 2012-2017 WPA/CPA Multisale EIS.

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 oil spills in coastal waters than is the general population because of their dietary reliance on wild coastal resources, their reliance on these resources for other subsistence purposes such as sharing and bartering, their limited flexibility in substituting wild resources with purchased ones, and their 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. BOEM's subject-matter experts have utilized available, credible information for this analysis. Although most criteria related to environmental justice may not be essential to a reasoned choice among alternatives, subsistence impacts may be essential. Nevertheless, subsistence research is pending and outcomes will not be available before publication of this Supplemental EIS. What credible information is available was applied using accepted methodologies. BOEM will continue to seek additional information as it becomes available and bases this analysis on the best information currently available. With the exception of a catastrophic accidental event, such as the *Deepwater Horizon* explosion, the impacts of oil spills, vessel collisions, and chemical/drilling fluid spills are not likely to be of sufficient duration to have adverse and disproportionate long-term effects for low-income and minority communities in the analysis area.

An event like the *Deepwater Horizon* explosion and oil spill could have adverse and disproportionate effects for low-income and minority populations in the analysis area. To date, there is little concrete evidence that such effects may have occurred (Brown et al., 2011; Dickey, 2012; King and Gibbons, 2011; Middlebrook et al., 2011; U.S. Dept. of Labor, OSHA, 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). Whether or not long-term impacts to low-income and minority populations will occur is unknown. While economic impacts have been partially mitigated by employers retaining employees for delayed maintenance or through the Gulf Coast Claims Facility Program's emergency funds, the physical and mental health effects to both children and adults within these populations could potentially unfold for many years. 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). Likewise, some low-income and/or minority groups may be more reliant on natural resources and/or less equipped to substitute contaminated or inaccessible natural resources with private market offerings. 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. The post-*Deepwater Horizon*'s human environment remains dynamic, and BOEM will continue to monitor these populations over time and to document short- and long-term impacts. The long-term impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup will be clearer as time allows the production of peer-reviewed research and targeted studies that determine those impacts.

The *Deepwater Horizon* explosion and oil spill was a low-probability catastrophic event. The kinds of accidental events (smaller, shorter time scale) that are likely to result from the CPA proposed action may affect low-income and/or minority populations more than the general population, at least in the shorter term. These higher risk groups may lack the financial or social resources and may be more sensitive and less equipped to cope with the disruption these events pose. These smaller events, however, are not likely to significantly affect minority and low-income populations in the long term.

Of all activities in the cumulative scenario, those that could potentially impact environmental justice in the CPA include (1) proposed actions and the OCS Program, (2) State oil and gas activity, (3) existing infrastructure associated with petrochemical processing including refineries and polyvinyl facilities,

(4) existing waste facilities including landfills, (5) coastal erosion/subsidence, (6) hurricanes, and (7) the lingering impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup. A detailed impact analysis of the cumulative impacts of OCS activities associated with proposed CPA Lease Sale 231 on environmental justice can be found in Chapter 4.2.1.23.4.4 of the 2012-2017 WPA/CPA Multisale EIS.

Because of the presence of an extensive and widespread support system for the OCS and associated labor force, the effects of the cumulative case are expected to be widely distributed and, except in Louisiana, little felt. In general, the cumulative effects of the OCS Program are expected to be economic and to have a limited but positive effect on low-income and minority populations. In Louisiana, these positive economic effects are expected to be greater. In general, who would be hired and where new infrastructure might be located is impossible to predict. Given the existing distribution of the OCS-related industry and the limited concentrations of minority and low-income peoples, the cumulative OCS Program would not have a disproportionate effect on these populations. Lafourche Parish would experience the most concentrated effects of cumulative impacts. These groups are not expected to be differentially affected because the parish is not heavily low income or minority and because the effects of road traffic and port expansion would not occur in areas of low-income or minority concentration.

The CPA proposed action is not expected to have disproportionate high/adverse environmental or health effects on minority or low-income people, and in the Gulf of Mexico coastal area, the contribution of the CPA proposed action and the OCS Program to the cumulative effects of all activities and trends affecting environmental justice issues over the next 40 years is expected to be negligible to minor. The cumulative effects would be concentrated in coastal areas, and particularly in Louisiana. Most OCS Program effects are expected to be in the areas of job creation and the stimulation of the economy, and they are expected to make a positive contribution to environmental justice. 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 in Alabama and Louisiana have similar, although more limited effects, due to their smaller scale. Cumulative effects from onshore infrastructure, including waste facilities, is 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 would be subject to relevant permitting requirements. Coastal landloss/subsidence, hurricanes, and global warming all raise environmental justice issues, as do the potential long-term effects of the *Deepwater Horizon* explosion, oil spill, and cleanup. The cumulative consequences to environmental justice cannot be determined at this time. Nevertheless, a single OCS lease sale added to existing State and Federal leasing programs and the associated onshore infrastructure would make only minor contributions to these cumulative effects.

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Additional research was conducted to investigate the availability of recent information affecting environmental justice since publication of the 2012-2017 WPA/CPA Multisale EIS. Various Internet sources were examined, including the websites of numerous Federal and State agencies, including the following: 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; Texas Commission on Environmental Quality; Louisiana Recovery Authority; and Louisiana Office of Community Development. 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*, and *The Energy Journal*. With regard to oil-spill claims related to the *Deepwater Horizon* explosion, oil spill, and cleanup, the Gulf Coast Claims Facility Transition Process is closed and the Court Supervised Settlement Program has been in operation since June 4, 2012 (Gulf Coast Claims Facility, 2012). An Economic and Property Damages Settlement was reached in early 2012 and includes the following types of claims: seafood compensation; business economic loss; individual economic loss; loss of subsistence; vessel physical damage; Vessel-of-Opportunity charter payment; coastal real property damage; wetlands real property damage; and real property sales loss. A Medical Benefits Settlement was also reached in early 2012 and offers benefits to qualifying people who resided in the United States as of April 16, 2012, who were either "Clean-Up

Workers" or who were residents in certain defined beachfront areas and wetlands ("Zones") during certain time periods in 2010. On May 2, 2012, the Court granted preliminary approval for the settlement and ordered that the Court-supervised settlement program begin accepting claims on June 4, 2012. For economic and property damages, valid claims will be paid as they are approved. For medical claims, payments and other benefits will be distributed after the final approval of the settlement and any appeals are resolved. The new official court-authorized claims administration website is located at http://www.deepwaterhorizoneconomicsettlement.com. Persons who filed a claim with the Gulf Coast Claims Facility for losses, such as subsistence, who's claims were rejected, or who have not already accepted a final settlement from BP may file a new claim with the *Deepwater Horizon* Claims Center (*Deepwater Horizon* Claims Center, 2012). The National Institute of Environmental Health Sciences announced in November 2012 that over 29,000 cleanup workers and volunteers were enrolled in the Gulf Long-Term Follow-Up (GuLF) STUDY, which is a national effort to determine if the Gulf oil spill led to physical or mental health problems. Enrollment was extended through March 1, 2013, to reach the National Institute of Environmental Health Sciences' target goal of 55,000 participants (National Institute of Environmental Health Sciences, 2012; Mackar, 2012; National Institutes of Health, 2013).

Information regarding the impacts of the *Deepwater Horizon* explosion, oil spill, and cleanup remains incomplete. Studies regarding environmental justice concerns in light of the *Deepwater Horizon* explosion, oil spill, and cleanup are still ongoing, and it may be years before data are available and certainly not within the timeframe contemplated by this NEPA analysis. The NRDA process, which is ongoing, may help to inform issues relating to subsistence and other indigenous reliance on natural resources. However, information related to NRDA is unavailable and unobtainable at this time, regardless of costs. In its place, BOEM's subject-matter experts have used credible information that is available and applied it using accepted socioeconomic methodologies. Although most criteria related to environmental justice may not be essential to a reasoned choice among alternatives, health impacts may be essential. Nevertheless, long-term health studies are pending and may not be available for use for several years or longer. What credible information is available was applied using accepted methodologies. BOEM will continue to seek additional information as it becomes available and bases the previous analysis on the best information currently available.

Summary and Conclusion

BOEM has reexamined the analysis for environmental justice presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information presented above. BOEM has determined that the additional information does not alter the impact conclusion for environmental justice because the information is currently inconclusive with regard to environmental justice issues and will remain so for an indefinite period of time. Therefore, the analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.1.24. 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 2012-2017 WPA/CPA Multisale EIS, 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 the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

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 presented in the 2012-2017 WPA/CPA Multisale EIS. The following information is a summary of the resource description incorporated from the 2012-2017 WPA/CPA Multisale EIS and any new information that has become available since the document was prepared.

A detailed description of species considered due to FWS concerns can be found in Chapter 4.2.1.24 of the 2012-2017 WPA/CPA Multisale EIS. A detailed explanation of the routine and accidental impact-producing factors can be found in Chapters 3.1 and 3.2 of the 2012-2017 WPA/CPA Multisale EIS, respectively. The cumulative analysis in the 2012-2017 WPA/CPA Multisale EIS considers the effects of impact-producing factors related to past CPA lease sales, proposed CPA Lease Sale 231, and reasonably foreseeable lease sale programs in the CPA. Cumulative impacts attributed to OCS activity co-occur with

State oil and gas activities, other governmental and private projects and activities, and pertinent natural processes and events that may occur that adversely affect wetlands. As a result of these activities and processes, several impact-producing factors discussed in Chapter 3.3 of the 2012-2017 WPA/CPA Multisale EIS would contribute to impacts on species considered due to FWS concerns and associated habitat during the life of proposed CPA Lease Sale 231.

Because of the mitigations that may be implemented (Chapter 2.4.1.3 of the 2012-2017 WPA/CPA Multisale EIS), 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. Lethal effects could occur from ingestion of accidentally released plastic materials from OCS 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 blowouts, 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, 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 species of concern within the CPA (Table 4-82 of the 2012-2017 WPA/CPA Multisale EIS); in comparison, non-OCS-related activities, such as habitat loss and competition, have historically proved to be of greater threat to the species of concern.

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 species populations (Table 4-82 of the 2012-2017 WPA/CPA Multisale EIS); therefore, the CPA proposed action would be expected to have little or no effect on the species of concern. The conclusions for the following species can be found in their respective chapters of this Supplemental EIS: West Indian manatee (**Chapter 4.2.1.12** of this Supplemental EIS and Chapter 4.2.1.12 of the 2012-2017 WPA/CPA Multisale EIS); green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles (**Chapter 4.2.1.13** of this Supplemental EIS and Chapter 4.2.1.13 of the 2012-2017 WPA/CPA Multisale EIS); Alabama, Perdido Key, and Choctawhatchee beach mice (**Chapter 4.2.1.15** of this Supplemental EIS and Chapter 4.2.1.15 of the 2012-2017 WPA/CPA Multisale EIS); red-cockaded woodpecker, Mississippi sandhill crane, piping plover, whooping crane, least tern, and wood stork (**Chapter 4.2.1.16** of this Supplemental EIS and Chapter 4.2.1.16 of the 2012-2017 WPA/CPA Multisale EIS); and Gulf sturgeon (**Chapter 4.2.1.17** of this Supplemental EIS and Chapter 4.2.1.17 of the 2012-2017 WPA/CPA Multisale EIS).

New Information Available Since the 2012-2017 WPA/CPA Multisale EIS

Various Internet sources were examined and literature searches were conducted in order to assess recent information regarding the species that may be pertinent to the CPA. BOEM has only focused on species within coastal parishes and counties because those are the species that could be potentially impacted by oil and gas development activities, including a potential OCS spill. No new information was discovered relevant to these analyses since the publication of the 2012-2017 WPA/CPA Multisale EIS, except as already described in the resource analysis above (e.g., marine mammals and sea turtles).

As data collected from the *Deepwater Horizon* explosion, oil spill, and cleanup continue to be gathered and impact assessments completed, a better characterization of the full scope of impacts to populations in the Gulf of Mexico from the *Deepwater Horizon* explosion and oil spill will be available. Relevant data on the status of populations after the *Deepwater Horizon* explosion, oil spill, and cleanup may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion and oil spill 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 the reasons stated herein and in the 2012-2017 WPA/CPA Multisale EIS. The CPA is an active oil and gas region with ongoing (or the potential for) exploration, drilling, and production activities. 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*), 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.

Summary and Conclusion

BOEM has reexamined the analysis for species considered due to FWS concerns presented in the 2012-2017 WPA/CPA Multisale EIS, based on the additional information provided above. No new significant information was discovered that would alter the impact conclusion for species considered due to FWS concerns presented in the 2012-2017 WPA/CPA Multisale EIS. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multisale EIS still apply for proposed CPA Lease Sale 231.

4.2.2. Alternative B—The Proposed Action Excluding 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 2.4.1.3.1 and Figure 2-1** of this Supplemental EIS and Chapter 2.4.1.3.2 of the 2012-2017 WPA/CPA Multisale EIS). All of the assumptions (including the seven 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 2.4.1.1**.

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 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 the CPA proposed lease sale. 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.

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 4.2**) 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
- Alabama, Choctawhatchee, St. Andrew and Perdido Key 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

The impacts to some Gulf of Mexico resources under Alternative B would be slightly different from the impacts expected under the CPA proposed action. These impacts are described below.

Impacts on Topographic Features

The sources and severity in impacts associated with this alternative are those 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, blowouts, oil spills, and structure removal. A more detailed discussion of these potential impact-producing factors and the appropriate mitigating measures is presented in **Chapters 2.4.1.3.1** of this Supplemental EIS and in Chapter 2.4.1.3.1 of the 2012-2017 WPA/CPA Multisale EIS.

Impacts of Routine and Accidental Events

Of the 16 topographic features in the CPA, 15 are located within water depths less than 200 m (656 ft). Geyer Bank is located in water depths of 190-210 m (623-689 ft). These features occupy a very small portion of the entire area. Of the potential impact-producing factors that may affect the topographic features, anchoring, structure emplacement, and structure removal would be eliminated by the adoption of this alternative. Effluent discharge and blowouts would not be a threat to the topographic features 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 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 in Chapter 3.2.1 of the 2012-2017 WPA/CPA Multisale 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 high pressure, having the effect of atomizing the oil into micro-droplets that have very little buoyancy. Under these conditions, a subsea oil plume could form and travel laterally with the prevailing currents. 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). 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 this 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 discusses 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, 1992b 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.

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 oil and gas 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 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.

4.2.3. Alternative C—No Action

Description of the Alternative

Alternative C is the cancellation of proposed CPA Lease Sale 231. 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 lease sale would be precluded or postponed to a future CPA lease sale. The No Action alternative encompasses the same potential impacts as a decision to delay the proposed lease sale to a later scheduled lease sale under the Five-Year Program, when another decision on whether to hold that future lease sale is made. As the potential impacts are the same, namely that most impacts related to Alternative A would not occur as described below, delay of the proposed lease sale was not considered as a separate alternative from Alternative C. Any potential environmental impacts resulting from proposed CPA Lease Sale 231 would not occur or would be postponed to a future lease sale decision.

Effects of the Alternative

This Agency published a report that examined previous exploration and development activity scenarios (USDOI, MMS, 2007a). This Agency 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 activity, and any single lease sale accounts for only a small percentage of the total OCS activities. In 2006, leases from 92 different sales contributed to Gulf of Mexico production, while an average CPA lease sales 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, while an average CPA lease sale, for example, 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, 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 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.

Environmental Impacts

If proposed CPA Lease Sale 231 were canceled, the resulting development of oil and gas would most likely be postponed to a future sale; therefore, the overall level of OCS activity in the CPA would only be reduced by a small percentage, if any. Therefore, the cancellation of proposed CPA Lease Sale 231 would not significantly change the environmental impacts of overall OCS 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 proposed CPA Lease Sale 231, the economic impacts of cancelling the scheduled lease sale should be given consideration. Chapter 4.2.1.23.3.2 of the 2012-2017 WPA/CPA Multisale EIS discusses the potential economic impacts of the CPA proposed action. In the event that proposed CPA Lease Sale 231 is cancelled or postponed, there may be impacts to employment along the Gulf Coast, but these are not expected to be significant (e.g., 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 proposed CPA Lease Sale 231. 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 proposed CPA Lease Sale 231. 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 in Texas and Louisiana for which the OCS industry as a whole is an important component of their economies.

From a programmatic perspective, cancellation of a Five-Year Program of lease sales in the Gulf of Mexico would have much greater effects in terms of economic impacts, energy strategy, and environmental impacts. For a more detailed discussion of the effects of the cancellation of a Five-Year Program of lease sales in the Gulf of Mexico, refer to Appendix G of the 2012-2017 WPA/CPA Multisale EIS.

Summary and Conclusion

Canceling a lease sale would eliminate the effects described for Alternative A (**Chapter 4.2.1**). Other sources of energy would substitute for the lost production. Principal substitutes would be additional imports, conservation, additional domestic production, and switching to other fuels. These alternatives, except conservation, have significant negative environmental impacts of their own. For example, tankering of fuels from alternate sources over longer distances would also have significant potential negative impacts, including through the increased risk of spills.

4.3. UNAVOIDABLE ADVERSE IMPACTS OF THE PROPOSED ACTIONS

Unavoidable adverse impacts associated with the WPA or CPA proposed action are expected to be primarily short term and localized in nature and are summarized below. Adverse impacts from catastrophic events could be of longer duration and extend beyond the local area. All OCS 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, and 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 WPA or 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 blowout 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 and blowouts because of evaporation and volatilization of the lighter components of crude oil, combustion from surface burning, and aerial spraying of dispersant chemicals. Mitigation of long-term effects from offshore engine combustion during routine operations would be accomplished through existing regulations and development of new control emission technology. 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.

Threatened and Endangered Species: Because the proposed WPA or 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 the 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 5.6**). 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 and Commercial Fisheries: Unavoidable adverse impacts from routine operations are loss of open ocean or bottom areas desired for fishing by the presence or construction of OCS 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. 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 could make landfall on or near protected archaeological landmarks to cause temporary aesthetic or cosmetic impacts until the oil is cleaned or degrades.

4.4. 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-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 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 structural 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 WPA or 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 WPA or CPA proposed action is presented in Table 3-1 of the 2012-2017 WPA/CPA Multisale EIS.

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.

4.5. 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 WPA or 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 delays the increase in 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 from the WPA or 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 0.116-0.200 BBO and 0.538-0.938 Tcf of gas from a typical WPA proposed action and 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 WPA or CPA lease sale is the period of time during which the activities and impacting factors that follow as a consequence of the proposed WPA or CPA lease sale would be influencing the environment.

The specific impacts of the WPA or 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 a 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 **Chapter 4** 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**.

The OCS development off Texas, 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 WPA or CPA proposed action could increase these incidental benefits of offshore development. Offshore fishing and diving has 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 (Chapters 4.2.1.23.1 and 4.2.1.23.2 of the 2012-2017 WPA/CPA Multisale 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/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 gChlorophyll *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 oil and gas 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 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 ACTIONS

This Supplemental EIS addresses two proposed Federal actions: one oil and gas lease sale in the WPA and one oil and gas lease sale in the CPA of the Gulf of Mexico OCS, as scheduled in the Five-Year Program (USDOI, BOEM, 2012a). The two proposed lease sales that are evaluated in this Supplemental EIS are proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231. 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 sales and Supplemental EIS. Key agencies and organizations included the National Oceanic and Atmospheric Administration (NOAA), NOAA's National Marine Fisheries Service (NMFS), U.S. Fish and Wildlife Service (FWS), U.S. Coast Guard (USCG), U.S. Department of Defense (DOD), U.S. Environmental Protection Agency (USEPA), State Governors' offices, and industry groups.

5.2. NOTICE OF INTENT TO PREPARE A SUPPLEMENTAL EIS AND CALL FOR INFORMATION

On July 9, 2012, the Notice of Intent to Prepare a Supplemental EIS (NOI) for the proposed WPA and CPA lease sales was published in the *Federal Register*. Additional public notices were distributed via the U.S. Postal Service, and the Internet. A 30-day comment period was provided; it closed on August 8, 2012. Due to a typographical error on the original NOI, the public scoping period was reopened on August 24, 2012, and closed on September 10, 2012. Federal, State, and local governments, along with other interested parties, were invited to send written comments to the Gulf of Mexico OCS Region on the scope of the Supplemental EIS. Consistent with 40 CFR 1502.9, no formal scoping meetings were required for the Draft Supplemental EIS. BOEM received seven comment letters in response to the NOI. These comments are summarized below in **Chapter 5.3.1**.

On July 9, 2012, the Call for Information (Call) for the proposed WPA and CPA lease sales was published in the *Federal Register*. The comment period closed on August 8, 2012. This Agency received two comment letters in response to the Call. 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 implementing NEPA. Scoping provides those with an interest in the OCS Program an opportunity to provide comments on the proposed actions. In addition, scoping provides BOEM an opportunity to update the Gulf of Mexico OCS Region's environmental and socioeconomic information base.

5.3.1. Summary of Scoping Comments

Comments were received in response to the NOI from State and local government agencies, interested groups, industry, and the general public on the scope of the 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. Comments received included the following:

- it is prudent to update the baseline conditions and potential environmental effects of oil and natural leasing and to study additional areas that may become available for lease in the future;
- the Supplemental EIS should focus specifically on "new information" that is readily available during the drafting of the Supplemental EIS;
- BOEM should not speculate on future results of ongoing studies;

- if the baseline has changed, this assumption should be verified through supporting scientific data;
- BOEM must consider the extensive safety improvements implemented by the industry and the new requirements imposed on offshore operations since the *Deepwater Horizon* explosion, oil spill, and cleanup;
- the possibility of a catastrophic spill remains a very low probability;
- the formation of well containment companies and their ability to assist in the response to any future incidents must be considered;
- the Supplemental EIS should be designed to serve as a document for future environmental reviews;
- the environmental and safety record of the offshore industry should be analyzed as part of the Supplemental EIS;
- impacts to Louisiana's coastal resources are currently not entirely taken into account during the Bureau of Ocean Energy Management's NEPA evaluation;
- damage to Louisiana's coastline is not always a direct result of one identifiable incident, but multiple secondary and cumulative impacts from activities enabled by OCS lease sales;
- a careful accounting of cumulative and indirect impacts is needed;
- oil and gas seismic should not be a major issue in the Supplemental EIS;
- marine environments and the Gulf waters could suffer serious, perhaps catastrophic, and long-lasting harm if an accident were to occur off the coast of Florida;
- any stipulations allowing the public to adequately evaluate the proposed action and the proposed mitigation for that action should be included in the proposed alternative;
- BOEM should provide additional information describing the process by which the ASLM adopts mitigation stipulations for the proposed lease sales and how and when the public would be able to provide comments on those stipulations added to the lease;
- BOEM should perform air quality impact analyses for all pollutants and standards that are specific to the proposed lease sales and should include this information in an appendix for public review and should verify that the exemption threshold formula, which BOEM relies upon to require air quality monitoring, is adequate to ensure compliance with NAAQS;
- BOEM should identify monitoring requirements, potential mitigation measures, and emerging technologies and discuss how these will ensure NAAQS compliance;
- the Supplemental EIS should not discuss Ocean Dredged Material Disposal Sites in combination with other types of disposal sites;
- in the event that aquatic losses are due to onshore or nearshore development in support of OCS oil and gas activities, the Supplemental EIS should contain a sufficient level of detailed information on these aquatic ecosystems, such as the locations, types, values, functions, and amount of aquatic sites in the potential development areas that could be directly and/or indirectly impacted;
- oil companies should be denied leases until they show they can operate in a clean, safe, decent way;
- any exploratory or production operations in close proximity to the Gulf Islands National Seashore may cause drilling-induced subsidence and impacts to wildlife,

and could potentially impact visitation to the barrier islands and to greater Gulfport and Biloxi, Mississippi, which could affect the region's heavily dependent tourism economy;

- seismic testing may disrupt natural processes, which could affect natural resources that the National Park Service is charged to preserve and protect;
- oil and gas drilling has a history of discharges emanating from these sources that may have cumulative effects to marine biota;
- storm-related debris from platforms as well as accidents in close proximity to the Gulf Islands National Seashore increases the risk that the Seashore or its inhabitants would be directly impacted;
- large and artificially lit oil and/or gas drilling platforms in view from the Gulf Islands National Seashore would result in significant impact to the scenery;
- the net increase in the amount of service or transport carriers would impose an intrusion to visitors who are attracted to the islands;
- should oil and/or gas rigs and drilling platforms be constructed within sight of the Mississippi barrier islands, the wilderness character of the Congressionally designated Horn and Petit Bois Islands as wilderness islands/areas would be significantly compromised; and
- the National Park Service encourages BOEM to further develop measures to locate, avoid, and protect archaeological resources in and around the leasing areas.

5.3.2. Summary of Comments Received in Response to the Call for Information

In response to the Call, BOEM received two comment letters: one letter from the Louisiana Department of Natural Resources and one letter from the American Petroleum Institute. 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 American Petroleum Institute 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 American Petroleum Institute further encourages BOEM to pursue legislation that will allow the entry into force of the Agreement between the United States and Mexico; this Agreement will govern the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico. Upon its entry into force, the whole and partial blocks that lie within the 1.4-nmi buffer zone north of the maritime boundary between the United States and Mexico, which were not offered in past lease sales, will become available for leasing and will no longer need to be excluded.

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 this NEPA process. The Gulf of Mexico OCS Region's Information Transfer Meetings provide an opportunity for BOEM analysts to attend technical presentations related to OCS Program activities and to meet with representatives from Federal, State, and local agencies; industry; BOEM contractors; and academia. Scoping and coordination opportunities were also available during BOEM's requests for information, comments, input, and review of its other NEPA documents, included the following:

- scoping and comments on the Five-Year Program's EIS; and
- requests for comments on the 2012-2017 WPA/CPA Multisale 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 the 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 July 9, 2012, included an invitation to other Federal agencies and State, Tribal, and local governments to consider becoming cooperating agencies in the preparation of this EIS. With one exception, no Federal agencies or State, Tribal, or local governments requested to participate as a cooperating agency. The National Park Service initially requested cooperating agency status. Following consultation with the office and discussion of their concerns, the National Park Service verbally withdrew their request.

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 document; a list of these libraries is available on BOEM's Internet website at http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/nepaprocess.aspx.

Federal Agencies

Congress
- Congressional Budget Office
- 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
- Corps of Engineers
- Department of the Air Force
- Department of the Army
- Department of the Navy
  - Naval Mine and Anti-Submarine Warfare 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
- 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

State and Local Agencies

Alabama
- Governor's Office
- Alabama Highway Department
- Alabama Historical Commission and State Historic Preservation Officer
- Alabama Public Service Commission
- Department of Conservation and Natural Resources
- Department of Environmental Management
- South Alabama Regional Planning Commission
- State Docks Department
- State Legislature Natural Resources Committee
- State Legislature Oil and Gas Committee

Florida
- Governor's Office
- Bureau of Archaeological Research
- City of Gulf Breeze
- City of Panama City
- City of Pensacola

Department of Community Affairs
- Department of Environmental Protection

- Department of State Archives, History and Records Management
- Escambia County
- Florida Coastal Zone Management Office
- Sarasota County Coastal Resources
- State Legislature Natural Resources and Conservation Committee
- State Legislature Natural Resources Committee
- West Florida Regional Planning Council

Louisiana

- Governor's Office
- City of Grand Isle
- City of Morgan City
- City of New Orleans
- Department of Culture, Recreation, and Tourism
- Department of Environmental Quality
- Department of Natural Resources
- Department of Transportation and Development
- Department of Wildlife and Fisheries
- Houma-Terrebonne Chamber of Commerce
- Jefferson Parish Director
- Jefferson Parish President
- Lafourche Parish CZM
- Lafourche Parish Water District #1
- Louisiana Geological Survey
- South Lafourche Levee District
- St. Bernard Planning Commission
- State House of Representatives, Natural Resources Committee
- State Legislature, Natural Resources Committee

Mississippi

- Governor's Office
- City of Gulfport
- Department of Archives and History
- Department of Natural Resources
- Department of Wildlife Conservation
- Mississippi Development Authority
- State Legislature Oil, Gas, and Other Minerals Committee

Texas

- Governor's Office
- Attorney General of Texas
- Aransas Pass Public Library
- Chambers County Library System
- City of Lake Jackson
- General Land Office
- Southeast Texas Regional Planning Commission
- State Legislature Natural Resources Committee
- State Senate Natural Resources Committee
- Texas Historical Commission
- Texas Legislation Council
- Texas Parks and Wildlife Department
- Texas Sea Grant
- Texas State Library and Archives
- Texas Water Development Board

Industry

- Air Armament Center
- Alabama Petroleum Council
- American Petroleum Institute
- Area Energy LLC
- Baker Atlas
- Bellwether Group
- B-J Services Co
- BP Amoco
- Chevron U.S.A. Inc.
- Coastal Conservation Association
- Coastal Environments, Inc.
- Continental Shelf Associates, Inc.
- Dominion Exploration & Production, Inc.
- Ecological Associates, Inc.
- Ecology and Environment
- Energy Partners, Ltd.
- EOG Resources, Inc.
- Escambia County Marine Resources
- Exxon Mobil Production Company
- Florida Petroleum Council
- Florida Propane Gas Association
- Freeport-McMoRan, Inc.
- Fugro Geo Services, Inc.
- Gulf Environmental Associates
- Gulf of Mexico Newsletter
- Horizon Marine, Inc.
- Industrial Vehicles International, Inc.
- International Association of Geophysical Contractors
- J. Connor Consultants
- John Chance Land Surveys, Inc.
- Marine Safety Office
- Midstream Fuel Service
- Mote Marine Laboratory
- Murphy Exploration & Production
- Newfield Exploration Company
- *Northwest Florida Daily News*
- Petrobras America, Inc.
- PPG Industries, Inc.
- Propane Market Strategy Newsletter
- Science Applications International Corporation
- Seneca Resources Corporation
- Shell Exploration & Production Company
- Stone Energy Corporation

Strategic Management Services-USA
T. Baker Smith, Inc.
Texas Geophysical Company, Inc.
The Houston Exploration Company
The Washington Post
Triton Engineering Services Co.
W & T Offshore, Inc.
WEAR-TV

Special Interest Groups

1000 Friends of Florida
Alabama Oil & Gas Board
Alabama Wildlife Federation
American Cetacean Society
Apalachee Regional Planning Council
Apalachicola Bay and Riverkeepers
Associated Gas Distributors of Florida
Audubon of Florida
Audubon Louisiana Nature Center
Bay County Audubon Society
Capital Region Planning Commission
Center for Marine Conservation
Citizens Assoc. of Bonita Beach
Clean Gulf Associates
Coalition to Restore Coastal Louisiana
Coastal Conservation Association
Concerned Shrimpers of America
Conservancy of Southwest Florida
Earthjustice
Florida Chamber of Commerce
Florida Natural Area Inventory
Florida Natural Gas Association
Florida Propane Gas Association
Florida Public Interest Research Group
Gulf and South Atlantic Fisheries Foundation, Inc.
Gulf Coast Environmental Defense
Gulf Restoration Network
Houma-Terrebonne Chamber of Commerce
Izaak Walton League of America, Inc.
JOC Venture
LA 1 Coalition, Inc.
League of Women Voters of the Pensacola Bay Area
Louisiana Wildlife Federation
Manasota-88
Marine Mammal Commission
Mission Enhancement Office
Mobile Area Chamber of Commerce
Mobile Bay National Estuary Program
Natural Resources Defense Council
Nature Conservancy
Offshore Operators Committee
Organized Fishermen of Florida
Pensacola Archaeological Society
Perdido Key Association
Perdido Key Chamber of Commerce
Population Connection
Portersville Revival Group
Restore or Retreat
Roffers Ocean Fishing Forecast Service
Santa Rosa Sound Coalition
Save the Manatee Club

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

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
- Plaquemines Port, Harbor and Terminal District
- Port of Baton Rouge
- Port of Iberia District
- Port of New Orleans
- Twin Parish Port Commission
- St. Bernard Port, Harbor and Terminal District
- West Cameron Port Commission

Mississippi
- Greenville Port Commission
- Mississippi State Port Authority
- Port of Gulfport

Texas
- Brownsville Navigation District—Port of Brownsville
- Port Freeport
- Port Mansfield/Willacy County Navigation District
- Port of Beaumont
- Port of Corpus Christi Authority
- Port of Galveston
- Port of Houston Authority
- Port of Isabel—San Benito Navigation District
- Port of Port Arthur Navigation District

Educational Institutions/Research Laboratories

Abilene Christian University
Dauphin Island Sea Laboratory
Florida A&M University
Florida Atlantic University
Florida Institute of Oceanography
Florida Institute of Technology
Florida Sea Grant College
Florida State University
Foley Elementary School
Gulf Coast Research Laboratory
Harbor Branch Oceanography
Jackson State University
Louisiana Sea Grant College Program
Louisiana State University
Louisiana Tech University
Louisiana Universities Marine Consortium
Loyola University
McNeese State University
Mississippi-Alabama Sea Grant Consortium
Mississippi State University
Mote Marine Laboratory
Nicholls State University
Pensacola Junior College
Tulane University
University of Alabama
University of Florida
University of Miami
University of New Orleans
University of South Alabama
University of South Florida
University of Southern Mississippi
University of Texas at Arlington
University of Texas at Austin
University of Texas Law School
University of Texas Libraries
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 provided the Secretary of the Interior with information from interested parties to help in the evaluation of the potential effects of the proposed WPA and CPA lease sales. An announcement of the dates, times, and locations of the public meetings was included in the Notice of Availability for 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 Internet website at http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/nepaprocess.aspx.

The public meetings were held on the following dates and at the times and locations indicated below:

Monday, December 3, 2012
1:00 p.m. CST
Houston Airport Marriott
at George Bush Intercontinental
18700 John F. Kennedy Boulevard
Houston, Texas 77032
4 registered attendees
0 speakers

Tuesday, December 4, 2012
1:00 p.m. CST
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123
1 registered attendee
0 speakers

Wednesday, December 5, 2012
1:00 p.m. CST
Courtyard by Marriott
Gulfport Beachfront MS Hotel
1600 East Beach Boulevard
Gulfport, Mississippi 39501
27 registered attendees
13 speakers

Thursday, December 6, 2012
1:00 p.m. CST
Five Rivers—Alabama's Delta
Resource Center
30945 Five Rivers Boulevard
Spanish Fort, Alabama 36527
2 registered attendees
0 speakers

Houston, Texas, December 3, 2012

There were no speakers at the public meeting held in Houston, Texas, on December 3, 2012.

New Orleans, Louisiana, December 4, 2012

There were no speakers at the public meeting held in New Orleans, Louisiana, on December 4, 2012.

Gulfport, Mississippi, December 5, 2012

Thirteen speakers provided testimony at the public meeting held in Gulfport, Mississippi, on December 5, 2012. Julia O'Neal of the Mississippi Chapter of the Sierra Club; Linda St. Martin, a resident of Harrison County, Mississippi; Henry Laird, a representative for 12 Miles South Coalition; Terese Collins, a representative of the Gulf Islands Conservancy; Steve Shepard, the Gulf Coast group chair of the Sierra Club; Reilly Hoche, a Mississippi organizer with the Gulf Restoration Network; Louis Skrmetta, operations manager for Ship Island Excursions; Connie Robert, a Supervisor with the Harrison County Board of Supervisors; and local residents/concerned citizens, Maxine Ramsey, Amanda Kennerly, John Anderson, Rene Chapman, and Betty Jo Miller provided testimony.

Ms. O'Neal reminded everyone that the consequences of the *Deepwater Horizon* explosion and oil spill will be long term and questioned the process for changing the stipulations as new information from the explosion and oil spill arises. She also expressed concern about natural gas exploration and drilling in Mississippi Sound and requested that certain areas of Mississippi Sound, including the Gulf Islands National Seashore and the Grand Bay National Estuarine Research Reserve, be excluded in the stipulation. She stressed that routine seismic testing is harassment to cetaceans and urged BOEM to mandate a change in the required lighting on both existing and newly developed rigs. Lastly, she advocated support for Alternative B (The Proposed Action Excluding the Blocks Near Biologically Sensitive Topographic Features).

Ms. Maxine Ramsey stated that the tourism industry will be affected by oil produced offshore of Mississippi and will erase any potential gain in revenue from the drilling. She reminded everyone that the extent and long-range effects from the BP oil disaster are not complete.

Ms. Kennerly requested that BOEM exclude all the drilling near the biologically sensitive recreation areas and that drilling be suspended for 12 mi (19 km) offshore. She emphasized that the area needed time to recover from the BP oil spill and expressed concern over the effects that drilling and seismic activities have on the dolphin population.

Ms. Martin asked for a 12-mi (19-km) moratorium from barrier islands and reminded everyone of the gas exposure incident on Dauphin Island.

Mr. Laird opposed all exploration, development, and production of oil and gas within 12 nmi (14 mi; 22 km) of the barrier islands to the Alabama border and the Louisiana border. He reminded everyone of the historical and ecological importance of the coastal areas of Mississippi.

Mr. Anderson reminded everyone of the biological and aesthetic sensitivity of the wilderness areas off the coast of the Mississippi and stated that drilling oil wells within 12 mi (19 km) of their shoreline is not consistent with maintaining wilderness off the coast of Mississippi.

Ms. Collins expressed concern for lease sales in areas of the Gulf that have sustained damage due to BP and the continuous leaking of other rigs, including the Taylor energy site; called for an independent monitoring program paid for by the energy industry to perform surveys of the Gulf and report to USCG; requested a whole or partial block exclusion extending 12 mi (19 km) south of the barrier islands of Mississippi; expressed concern for the safety of wildlife during the routine operations of oil drilling; called for drilling muds to be removed from the drilling site and not be allowed to deteriorate on the seafloor; called for a ban on chemical dispersants and expressed concern over their effects on wildlife; expressed concern over military activities that occur over oil rigs; requested that a wildlife rehabilitation center be placed close to Mississippi; and commented that old and aging pipelines are not addressed in this Supplemental EIS.

Mr. Shepard asked for a moratorium on the area from the park (Gulf Islands National Seashore) boundary to 12 mi (19 km) and noted that the economy is severely impacted and that tourism is reduced to such an extent that the loss could not be made up by the gas industry.

Mr. Hoche asked BOEM to consider and ultimately choose an alternative that excludes leasing areas of Federal waters 12 mi (19 km) south of Mississippi's barrier islands due to the ecological and cultural significance of the islands. He reminded everyone of the impact that drilling will have on global warming and called for the inclusion of cumulative onshore impacts, including pollution and impacts from infrastructure associated with the extraction of fossil fuels, in this Supplemental EIS.

Mr. Chapman emphasized the loss of residents and culture along the Gulf Coast due to three natural disasters in the area and due to the impact that BOEM's activities have on the Nation, future generations, and natural resources.

Ms. Miller called for the oil wells to be located well away from the barrier islands and national parks where they will not pose a safety risk and do not affect the aesthetics of the tourism industry. She also requested that activities be delayed until a cause for the recent dolphin deaths can be determined.

Mr. Skrmetta respectfully requested that BOEM establish a 12-mi (19-km) buffer between Mississippi's barrier islands and any future drilling and that BOEM remove all Federal blocks within this zone. He acknowledged the importance of the oil and gas industry to the Nation's economy, but reminded us that local tourism also provides a significant economic benefit for the region.

Ms. Robert expressed concern about the health of the environment and the economic health of the Gulf Coast due to its reliance on its connection with the Gulf. She noted that drilling is jeopardizing the economic benefit that the State receives from the tourism industry surrounding the Gulf.

Mobile (Spanish Fort), Alabama, December 6, 2012

There were no speakers at the public meeting held in Mobile, Alabama, on December 6, 2012.

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 CD's will be prepared for the affected States prior to proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231. To prepare the CD's, BOEM reviews each State's Coastal Management Plan (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. The Coastal Zone Management Act (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 930 Subpart C).

Based on these and other analyses, BOEM's Director makes an assessment of consistency, which is then sent to each State with the Proposed Notice of Sale. If a State concurs, BOEM can hold the lease sale. A State's concurrence may be presumed when a State does not provide a response within the 60-day review period. If a State objects, it must do the following under the CZMA: (1) indicate how BOEM's prelease proposal is inconsistent with their CMP and suggest alternative measures to bring BOEM's proposal into consistency with their CMP; or (2) 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 no procedure for administrative appeal to the Secretary of Commerce for a Federal CD for prelease activities. Either BOEM or a State may request mediation. Mediation is voluntary, and the Department 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 (ESA) (16 U.S.C. 1631 et seq.), as amended (43 U.S.C. 1331 *et seq*.), establishes a national policy designed to protect and conserve threatened and endangered species and the ecosystems upon which they depend. BOEM is currently in consultation with NMFS and FWS regarding the OCS oil and gas program in the Gulf of Mexico, including as it relates to the WPA and CPA proposed actions. 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. The programmatic consultation will also include postlease activities associated with OCS oil and gas activities in the Gulf of Mexico, including G&G and decommissioning activities.

With consultation ongoing, BOEM and BSEE will continue to comply with all Reasonable and Prudent Measures and the Terms and Conditions under these 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 600) on January 17, 2002. Certain OCS activities authorized by BOEM may result in adverse effects to EFH, and therefore, require EFH consultation.

Following the *Deepwater Horizon* explosion, oil spill, and cleanup, 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 will begin with the 2012-2017 Five-Year Program. BOEM has an EFH Assessment (Appendix D of the 2012-2017 WPA/CPA Multisale EIS) that describes the OCS proposed activities, analyzes the effects of the proposed activities on EFH, and identifies proposed mitigation measures. The programmatic EFH consultation, which covers proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231, was initiated with the distribution and review of the 2012-2017 WPA/CPA Multisale EIS and with the subsequent written communications between BOEM and 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 (16 U.S.C. 470), Federal agencies are required to consider the effect of their undertakings on historic properties. The implementing regulations for Section 106 of the National Historical Preservation Act (16 U.S.C. 470f), issued by the Advisory Council on Historic Preservation (16 CFR 800), specify the required review process. The BOEMRE initiated a request for consultation on the 2012-2017 WPA/CPA Multisale EIS on November 12, 2010, via a formal letter. That letter was addressed to each of the affected Gulf Coast States and Tribal Nations, including the Alabama-Coushatta Tribes of Texas, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Indian Tribe, Jena Band of Choctaw Indians, Miccosukee Indian Tribe of Florida, Mississippi Band of Choctaw Indians, Poarch Band of Creek Indians, Seminole Tribe of Florida, and Tunica-Biloxi Indian Tribe of Louisiana. A response timeline of 30 days was provided and three responses were received.

The State of Louisiana, in a letter to BOEMRE dated December 16, 2010, indicated that no known historic properties will be affected by this undertaking and that consultation regarding the proposed actions is not necessary. The State of Alabama, in a letter to BOEM referencing proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231 dated July 18, 2012, requested that a "Maritime Cultural Resource Assessment which meets the AHC [Alabama Historical Commission] standards should be conducted for any action within these sale blocks" and that the resulting report should be forwarded to their office for review and approval. Additional correspondence with the State of Alabama explained that cultural resource assessments are completed as part of BOEM's postlease requirements and that they are site specific and are completed prior to authorization or approval of all proposed oil and gas activities. When necessary, cultural resource reports are also forwarded to the appropriate State agency as part of the Section 106 consultation process. A subsequent letter from the State of Alabama, dated August 16, 2012,

agreed with the proposed lease actions, provided that submerged cultural resources are addressed prior to disturbance, as outlined above.

The Seminole Tribe of Florida-Tribal Historic Preservation Officer (STOF-THPO) responded to BOEMRE's request for consultation on December 6, 2010. The STOF-THPO indicated that there was no objection to the proposed undertakings at this time. The STOF-THPO requested to review the impending remote-sensing survey reports that are to be conducted over the high-probability zones within the project area. Additionally, the STOF-THPO requested to be notified if cultural resources that are potentially ancestral or historically relevant to the Seminole Tribe of Florida are inadvertently discovered at any point during this process.

None of the above-referenced responses requested consultation. No further responses were received beyond the 30-day timeline and no requests for consultation were received. BOEM will 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.

5.10. Major Differences Between the Draft and Final Supplemental EIS's

Comments on the Draft Supplemental EIS were received during the public meetings and were also received via written and electronic correspondence. As a result of these comments, changes have been made between the Draft and Final Supplemental EIS's. Where appropriate, the text in this Final Supplemental EIS has been revised or expanded to provide clarification on specific issues, as well as to provide updated information. None of the revisions between the Draft and Final Supplemental EIS's changed the impact conclusions for the physical, environmental, and socioeconomic resources analyzed in this Supplemental EIS.

5.11. Comments Received on the Draft Supplemental EIS and BOEM's Responses

The Notice of Availability and the announcement of public meetings were published in the *Federal Register* on November 9, 2012, were posted on BOEM's Internet website, and were mailed to interested parties. The comment period ended on December 24, 2012. BOEM received 10 emails in response to the Draft Supplemental EIS. Six of the emails contained comments similar to those in the email from Jonathon Giuffria. BOEM also received 15 comment letters from Federal, State, and local agencies; industry; special interest groups; and the general public. These letters and emails are listed below:

Federal Agencies
- Department of Commerce
  - National Oceanic and Atmospheric Administration, National Marine Fisheries Service
- Department of the Army
  - Corps of Engineers
- Department of the Interior
  - Fish and Wildlife Service
  - National Park Service
- Environmental Protection Agency

State Agencies and Representatives
- Alabama Department of Environmental Management
- Florida Department of Agriculture and Consumer Services
- Louisiana Department of Natural Resources

Local Agencies
- ManaSota-88

Organizations and Associations
- American Petroleum Institute

Industry
- ConocoPhillips

General Public
- Sara Barnes
- Augustine Brotherton
- Carroll Campbell
- Jonathon Giuffria
- Jean Public (2)
- Lori Massey
- Willena R. Matta

Copies of these letters and emails are presented on the subsequent pages. Each letter and email's comments have been marked for identification purposes. BOEM's responses immediately follow each letter and email.

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON TX 77553-1229

NOV 3 0 2012

Policy Analysis Section

SUBJECT: Comments on the Western Planning Area (WPA) 233/ Central Planning Area (CPA) 231 Draft Supplemental Environmental Impact Statement (EIS)

Mr. Gary D. Goeke
Chief, Regional 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

Dear Mr. Goeke:

This concerns the U.S. Army Corps of Engineers, Galveston District (Corps) review of the WPA 233 and CPA 231 Draft Supplemental EIS. The U.S. Department of Interior, Bureau of Ocean Energy Management (BOEM) the lead Federal agency in preparation of the EIS. The proposed projects are located within the northwestern portion of the Gulf of Mexico outer continental shelf.

The Secretary of the Army has authority to prevent obstruction to navigation in navigable waters of the United States (U.S.) was extended to artificial islands, installations, and other devices located on the seabed, to the seaward limit of the outer continental shelf, as per Section 4(e) of the Outer Continental Shelf Lands Act of 1953 as amended (43 U.S.C. 1333(e)). Therefore, any devices permanently or temporarily attached to the seabed, to the seaward limit of the outer continental shelf, are required to obtain a Department of the Army (DA) Permit from the Corps.

Also, the Corps regulates the placement of structures and/or work performed in/or affecting navigable waters of the U.S. under Section 10 of the Rivers and Harbors Act of 1899. The Corps also regulates the discharge of dredged and/or fill material into waters of the U.S., including navigable waters, under Section 404 of the Clean Water Act. Therefore, the placement of structures and/or the discharge of dredged or fill material into this water of the U.S. requires a DA Permit from the Corps.

COE-1

Please inform any potential participant of the Outer Continental Shelf Oil & Gas Leasing Program, specifically within the WPA, of these permitting requirements and to give them our contact information. We look forward to discussing the Corps permit program with any potential participant of the Outer Continental Shelf Oil & Gas Leasing Program.

Regulatory Branch
Galveston District USACE
2000 Fort Point Road
P.O. Box 1229
Galveston, Texas 77553-1229
Telephone: 409-766-3930
FAX: 409-766-6301

If you have any questions, please contact Ms. Kristi N. McMillan at the letterhead address, by telephone at 409-766-3083, or by email at Kristi.N.McMillan@usace.army.mil.

Sincerely,

for Fred Anthamatten
Chief, Regulatory Branch

COE-1 Comment noted. BOEM and BSEE routinely conduct meetings with industry and other Federal agencies to inform operators of other regulatory requirements, including but not limited to, Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act of 1899. In addition, BOEM includes in its sale documents a document entitled "Information to Lessees (ITL)" designed to inform potential lease sale bidders of select applicable Federal requirements and other information that may be of benefit to bidders participating in a lease sale. A notice on "Navigation Safety" is provided in the ITL to advise bidders that operations on certain blocks may be restricted by the designation of fairways, precautionary zones, anchorages, safety zones, or traffic separation schemes established by the U.S. Coast Guard. It also makes bidders aware of COE permits required for construction of any artificial islands, installations, and other devices permanently or temporarily attached to the seabed located on the OCS in accordance with Section 4(e) of the Outer Continental Shelf Lands Act.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
(727)824-5317; FAX (727) 824-5300
http://sero.nmfs.noaa.gov/

DEC 2 0 2012

F/SER4:DD

Mr. Gary D. Goeke, Chief
Regional Assessment Section
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
Office of Environment (GM 623E)
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Dear Mr. Goeke:

NOAA's National Marine Fisheries Service (NMFS) Southeast Region Habitat Conservation Division has reviewed the Draft Supplemental Environmental Impact Statement (DSEIS) for Gulf of Mexico Outer Continental Shelf (OCS) Oil and Gas Lease Sales: 2013-2014. The DSEIS updates analyses of the proposed Western Planning Area Lease Sale 233 and Central Planning Area Lease Sale 231 from the July 2012 Final Environmental Impact Statement for Gulf of Mexico OCS Oil and Gas Program for 2012-2017 (Five-Year Program).

Pursuant to Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), federal agencies are required to consult with the NMFS on any action that may result in adverse effects to essential fish habitat (EFH). A Programmatic EFH consultation (Programmatic) for the Five-Year Program was completed on June 8, 2012. The EFH conservation recommendations identified in the Programmatic are sufficient to address potential adverse impacts associated with the lease sales encompassed in the DSEIS.

NMFS-1

Section 5.7 of the DSEIS briefly summarizes the process used to complete the Programmatic for the Five-Year Program. This section would benefit from additional detail regarding the content of the Programmatic. Rather than provide specific language, I recommend continued coordination between our regional staffs to further develop this section for the final Supplemental Environmental Impact Statement.

The Magnuson-Stevens Act does not require a response to this letter. Please contact Mr. David Dale regarding matters associated with the Programmatic EFH consultation or if you have further questions. He is available at 727-824-5317 or by email at david.dale@noaa.gov.

Sincerely,

Virginia M. Fay
Assistant Regional Administrator
Habitat Conservation Division

cc: via electronic mail
File
F/SER – Keys, Swafford, Bernhart
F – McCune, Leathery
PPI NEPA – Nunenkamp
GMFMC – Bortone

NMFS-1 Comment noted. Coordination has occurred with NMFS. Additional information has been added to **Chapter 5.7** to discuss the status of ESA consultation activities with NMFS.

United States Department of the Interior

NATIONAL PARK SERVICE
Southeast Regional Office
Atlanta Federal Center
1924 Building
100 Alabama St., SW.
Atlanta, Georgia 30303

IN REPLY REFER TO:
DEC-12/0148

DEC 2 1 2012

Mr. Gary D. Goeke
Bureau of Ocean Energy Management
Regional Assessment Section
Office of Environment (GM 623E)
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Dear Mr. Goeke:

The National Park Service (NPS) has reviewed the Draft Supplemental Environmental Impact Statement (SEIS) for the proposed Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales, Western Planning Area Lease Sale 233 and Central Planning Area Lease Sale 231.

After review of the Draft SEIS, the NPS offers the following scoping comments for your consideration in the development of the Final SEIS. These comments are similar to our July 24, 2012, memorandum pertaining to the Final Environmental Impact Statement (FEIS), Gulf of Mexico Outer Continental Shelf Oil and Gas Lease Sales, 2012-2017; Western Planning Area Lease Sales 229, 233, 238, 246, and 248; and the Central Planning Area Lease Sales 227, 231, 235, 241, and 247 (2012-2017 WPA/CPA Multisale EIS); and our September 10, 2012, memorandum pertaining to the Notice of Intent to prepare an SEIS for the Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales, Western Planning Area Lease Sale 233 and Central Planning Area Lease Sale 231.

General Comments

We welcome this opportunity to cooperate with BOEM in evaluating the proposed oil and gas lease sales in the Western and Central Planning Areas in the Gulf of Mexico.

Specific Comments

Section 4.1.2.21. Recreational Resources

1. Encumbered Viewshed, Degraded Scenery, and Diminished Visitor Experience: The NPS previously commented that large and artificially lit oil and/or gas drilling platforms in view from the barrier islands could result in significant impacts to the scenery and

quality of experience that many visitors seek in their travel to the barrier islands. As noted in the 2012-2017 WPA/CPA Multisale EIS, Section 4.2.1.21.2 - Impacts of Routine Events, "*Routine OCS oil and gas activities can affect recreation and tourism in diverse ways. The OCS activities can have direct negative impacts on beach and coastal recreational resources through discharges of marine debris, noise, and visual impairments.*" In addition, this section states, "*The extent to which the visibility of OCS platforms can affect tourism depends primarily on the distance of platforms from shore and on the size of the particular platform. For example, a study by the Mississippi Development Authority found that a 50-ft (15-m) high production platform was identifiable 3 mi (5 km) from shore and a 100-ft (30-m) high production platform was visible 10 mi (16 km) from shore (Collins Center for Public Policy, 2010).*" Similarly, the predicted net increase in the amount of service or transport carriers (e.g., vessels and helicopters) going to and from the rigs via navigational channels or flight paths in close proximity to the barrier islands on a regular and reoccurring basis may impose an intrusion to visitors who are attracted to the islands in order to experience a natural setting and view that is unencumbered by the conveyances of modern technology and industry. Should single or multiple oil and/or gas rigs and drilling platforms be constructed, the potential may exist for a corollary affect in reducing visitation to the barrier islands and the greater Gulfport and Biloxi, Mississippi areas as a whole, which would likely have a multiplier effect in reducing the Region's highly dependent tourism economy. Section 4.2.1.21 of the draft SEIS bases its analysis on the conclusions reached in the 2012-2017 WPA/CPA Multisale EIS. As noted, the NPS previously requested that BOEM conduct additional studies to quantify the potential visual effects to NPS units. No new information was presented in the draft SEIS that identified or addressed NPS concerns.

NPS-1

2. <u>Degradation of Aesthetics and Wilderness Character</u>: NPS expressed its concern that if single or multiple oil and/or gas rigs and drilling platforms are constructed within sight of the barrier islands, the existing wilderness character of the Congressionally designated Horn and Petit Bois wilderness islands/areas would be significantly compromised. The wilderness values of solitude and unabated scenery of the surrounding seascapes afforded by these islands could be adversely altered. The NPS previously requested that BOEM include an expanded analysis that recognizes and addresses this concern. No new information was presented that identified or addressed this concern.

NPS-2

Summary Comments

The Draft SEIS concludes that no new significant information was discovered that would alter the impact conclusion for recreational resources presented in the 2012-2017 WPA/CPA Multisale EIS. As noted in our prior comments, NPS requested that BOEM conduct a visual analysis study to quantify the potential visual effects to NPS units. No additional studies were presented within the Draft SEIS that identified and addressed NPS concerns.

NPS-3

For the rationale stipulated above, the NPS has continued concerns with the proposed lease sales and potential exploration and production of oil and gas resources within the Gulf of Mexico. We feel lease sales in proximity of units of the NPS could lead to the degradation of the natural and

cultural resources and values of GUIS that are nationally significant, and in which the NPS is entrusted by the American public to conserve and protect in perpetuity. We request that BOEM reconsider our comments within the framework of the National Environmental Policy Act process.

Should you have any questions, or need additional information concerning this request, please contact Mr. Steven Wright, Southeast Regional Office Planning and Compliance Division, by calling (404) 507-5710.

Sincerely,

Gordon Wissinger
Acting Regional Director
Southeast Region

NPS-1 Comment noted. The text of this Final Supplemental EIS has been revised to address the comments on the impacts of the OCS Program on the Gulf Islands National Seashore. Information was added regarding the visibility of OCS structures from the Mississippi coastline. Additional information regarding routine impacts of the OCS Program on recreational resources in the CPA can be found in Chapter 4.2.1.21.2 of the 2012-2017 WPA/CPA Multisale EIS. BOEM will consider the National Park Service's suggestions when developing future research projects.

BOEM has continued ongoing coordination efforts with the National Park Service to better understand its concerns and to explain BOEM's leasing program process to determine if any mitigation measures can be and should be implemented for lease sales in the area adjacent to Gulf Islands National Seashore. During the discussions, the National Park Service has not provided any documentation that would change the conclusions in the analyses in this Supplemental EIS nor have they recommended to stall, delay, or cancel a proposed lease sale.

NPS-2 Comment noted. As the comment response related to the degradation of aesthetics and the wilderness character of Horn and Petit Bois wilderness islands/areas equally applies to the Gulf Islands National Seashore, please refer to the response to Comment NPS-1.

NPS-3 Refer to the response to comment NPS-1.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

January 7, 2013

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, LA 70133-2394

Subject: EPA NEPA Review Comments on BOEM's DSEIS for "Gulf of Mexico Outer Continental Shelf (OCS) Oil and Gas Lease Sales: 2013-2014 Western Planning Area Lease Sales 233: Central Planning Area Lease Sales 231"; CEQ #20120358

Dear Mr. Goeke:

The U.S. Environmental Protection Agency (EPA) 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 lease sales in the Gulf of Mexico (GOM) Outer Continental Shelf (OCS) for lease blocks in both the Central Planning Area (CPA) and the Western Planning Area (WPA). Since the proposed action impacts areas in Region 4 and Region 6 both EPA regions participated in this review. We appreciate the BOEM providing the EPA additional time to review this EIS.

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 other DSEISs for lease sales in the CPA and WPA of the GOM OCS Region.

Based on our analysis of the above referenced proposed action, EPA rates this DEIS as **"EC-2" i.e., EPA has "Environmental Concerns and Request Additional Information"** in the Final EIS (FEIS). 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, coastal ecosystems, wetlands, mitigation, and impacts on environmental justice populations. Detailed comments are enclosed with this letter which more clearly identifies our concerns and comments. We request that a dedicated section of the FSEIS include specific responses to our comments.

EPA appreciates the opportunity to review the DSEIS. Should BOEM 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,

Heinz J. Mueller
Chief, NEPA Program Office
Office of Policy and Management

U.S. EPA DETAILED 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 SALES: 2013-2014 WESTERN PLANNING AREA LEASE SALES 233: CENTRAL PLANNING AREA LEASE SALES 231

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 areas in the Central and Western Planning Areas (CPA and WPA). A total of 2 lease sales are being proposed, one block in the CPA and one block in the WPA. EPA understands that "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 WPA and CPA since publication of the 2012-2017 WPA/CPA Multisale EIS. This Supplemental EIS analyzes the potential impacts of proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231 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. As described by BOEM, the need for the proposed actions (lease sales) is to further the orderly development of OCS resources."[1]

ALTERNATIVES PROPOSED:

Alternatives for Proposed WPA Lease Sales 233

Alternative A—The Proposed Action: This is BOEM's preferred alternative. This alternative would offer for lease all blocks within the WPA lease sale area (**Figure 2-1**), with the following exception:

> (1) whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary (i.e., the boundary as of the publication of this Supplemental EIS).

Alternative A of the 2012-2017 WPA/CPA Multisale EIS also included an exclusion of whole and partial blocks that lie within the 1.4-nmi buffer zone north of the maritime boundary between the United States and Mexico. The U.S. and Mexico have been pursuing an Agreement to govern the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico. On February 20, 2012, the Agreement was signed by representatives of each Government, but it has not yet entered into force. Upon its entry into force, the blocks and acreage in this buffer zone that were not offered in past lease sales will become available for leasing. As the Agreement may enter into force prior to the tentative date scheduled to hold proposed

[1] p. 1-3

WPA Lease Sale 233, BOEM has considered this 1.4-nmi buffer area as being potentially available for lease under Alternative A.

Although the leasing of portions of the WPA and CPA (subareas or blocks) can be deferred during a Five-Year Program, DOI is conservative throughout the NEPA process and includes the total area within the Gulf of Mexico planning areas for environmental evaluation. The proposed WPA lease sale area encompasses about 28.58 million ac. As of October 2012, approximately 20.8 million ac of the proposed WPA lease sale area are currently unleased. The estimated amount of resources projected to be developed as a result of the proposed WPA lease sale is 0.116-0.200 BBO and 0.538-0.938 Tcf of gas (**Table 3-1**).

Alternative B—The Proposed Action Excluding the Unleased Blocks Near Biologically Sensitive Topographic Features: This alternative would offer for lease all unleased blocks in the WPA, as described for the proposed action (Alternative A), with the exception of any unleased blocks subject to the Topographic Features Stipulation.

Alternative C—No Action: This alternative is the cancellation of proposed WPA Lease Sale 233. The opportunity for development of the estimated 0.116-0.200 BBO and 0.538-0.938 Tcf of gas that could have resulted from proposed WPA Lease Sale 233 would be precluded or postponed. Any potential environmental impacts resulting from proposed WPA Lease Sale 233 would not occur or would be postponed. This is also analyzed in the EIS for the Five-Year Program on a nationwide programmatic level.[2]

Alternatives for Proposed CPA Lease Sales 231
Alternative A—The Proposed Action: This is BOEM's preferred alternative. This alternative would offer for lease all blocks within the CPA lease sale area (**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 beyond the United States Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap.

Alternative A of the 2012-2017 WPA/CPA Multisale EIS also included an exclusion of whole and partial blocks that lie within the 1.4-nmi buffer zone north of the maritime boundary between the United States and Mexico. The U.S. and Mexico have been pursuing an agreement to govern the development of reservoirs of petroleum and natural gas straddling the U.S.-Mexico maritime and continental shelf boundary in the Gulf of Mexico. On February 20, 2012, the "Agreement between the United States of America and the United Mexican States Concerning Transboundary Hydrocarbon Reservoirs in the Gulf of Mexico" (Agreement) was signed by representatives of each Government, but it has not yet entered into force. Upon its

[2] Alternatives Proposed for WPA cited directly from DSEIS p. 2-4

entry into force, the blocks and acreage in this buffer zone that were not offered in past lease sales will become available for lease. As the Agreement may enter into force prior to the tentative date scheduled to hold proposed CPA Lease Sale 231, BOEM has considered this 1.4-nmi buffer area as being potentially available for lease under Alternative A.

Although the leasing of portions of the CPA (subareas or blocks) can be deferred during a Five-Year Program, DOI is conservative throughout the NEPA process and includes the total area within the Gulf of Mexico planning areas for environmental evaluation.

The proposed CPA lease sale area encompasses about 63 million ac of the total CPA area of 66.45 million ac. As of October 2012, approximately 42.9 million ac of the proposed CPA lease sale area are currently unleased. The estimated amount of resources projected to be developed as a result of proposed CPA Lease Sale 233 is 0.460-0.894 BBO and 1.939-3.903 Tcf of gas (**Table 3-1**).

Alternative B—The Proposed Action Excluding the Blocks Near Biologically Sensitive Topographic Features: This alternative would offer for lease all blocks in the lease sale area, as described for the proposed action (Alternative A), with the exception of any unleased blocks subject to the Topographic Features Stipulation.

Alternative C—No Action: This alternative is the cancellation of proposed CPA Lease Sale 231. 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 proposed CPA Lease Sale 231 would be precluded or postponed. Any potential environmental impacts resulting from proposed CPA Lease Sale 233 would not occur or would be postponed. This is also analyzed in the EIS for the Five-Year Program on a nationwide programmatic level.[3]

EPA COMMENTS:

USEPA-1

ALTERNATIVES (page 2-4)
In general, Alternative B (The Proposed Action Excluding the Unleased Blocks Near Biologically Sensitive Topographic Features) appears to be the more environmentally sensitive approach with regard to the resources targeted by this review. In addition, the potential mitigating measures that have been incorporated into the lease stipulations for topographic features and protected species are recommended. Lastly, no information was provided regarding the estimated resources that could be developed under Alternative B (BBO and Tcf of gas). This is critical information when comparing the Alternatives. EPA recommends providing estimates of the potential resources that could be developed under Alternative B in the FSEIS.

[3] Alternatives Proposed for WPA cited directly from DSEIS p. 2-4& 2-5

AIR
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. As such, the EPA will be using the FSEIS prepared by BOEM for WPA Lease Sale 233 and CPA Lease Sale 231 as a decision making document for our required permitting actions.

EPA concurs with BOEMs approach of providing supplemental contemporaneous air quality modeling for the proposed lease sale areas. Our specific comments on the modeling assessment are below. We have also included general comments on the air quality impacts and related analyses presented in the DSEIS. Our most significant concerns continue to be the potential impacts and increment consumption of fine particulates ($PM_{2.5}$) at the Breton Wildlife Class I area, the impact on the short term National Ambient Air Quality Standard (NAAQS) for nitrogen dioxide (NO_2), and the quantification of impacts of ozone and ozone precursors, especially on onshore non-attainment areas.

I. General Comments on Air Quality Impacts

Ozone Impacts
The DSEIS notes studies conducted in 1995 (Gulf of Mexico Air Quality Study), 2004 (2000 Gulf-wide emissions inventory), and 2008 (Assessment of onshore air quality impacts for the eastern Gulf Coast) as the basis of not performing ozone modeling for this analysis. The 2004 and 2008 studies were unpublished (References, Appendix A). The DSEIS concludes that contributions to ozone exceedances shown by these studies are "minor" and "slight" (Section 4.2.1.1).

USEPA-2

EPA recommends providing summary data of projected onshore ozone impacts from the noted studies to explain the basis of BOEM's determination that OCS activities "contribute only slightly to onshore ozone exceedances in the Houston/Brazoria/Galveston area of Texas, and the States of Louisiana, Mississippi, Alabama, and Florida."[4] If these studies contain projections of impacts to monitored ozone concentrations or ozone design values, please include in the FSEIS. In addition, EPA recommends that the DSEIS include information on how previous studies, dating back 18 years, and relied upon for the ozone impact conclusions continue to provide a relevant assessment of the projected impacts from the lease sales. The DSEIS states:

[4] DSEIS – Appendix A – page A-7

"Because the OCS Program includes both new drilling and production as well as production ending on older wells and platform removal, the level of impacts determined in earlier studies are assumed to adequately represent current conditions as well"[5]

USEPA-2

The conclusion drawn from the reasoning is neither intuitive nor supported in the DSEIS, considering that the lease sale will open additional lease blocks and drilling in different areas. To support this conclusion, EPA recommends that the FSEIS provide documentation to justify that the frequency and duration of drilling and production operations are equivalent to the future projections for the lease sales, and that emissions will impact the same onshore areas as the previous studies. If this documentation shows that a significant increase or differences in activity will occur due to the lease sale, EPA recommends that emission modeling should be updated.

USEPA-3

Air Quality Impact Conclusions

The DSEIS indicates that BOEM is confident that offshore oil and gas activities associated with the CPA/WPA proposed action will not contribute to exceedances of the NAAQS at the shoreline and project impacts will be "well within the NAAQS."[6] Appendix A, however, indicates that slight contributions to ozone exceedances may occur in onshore areas, but no additional analysis or supporting data was provided. In addition, the OCD modeled impacts for 1-hr NO_2 represent 29% and 44% of the Class I area and Class II NAAQS respectively, which would be considered significant by EPA and warrant further analysis. Finally, given that worst-case emissions (considering the pollutant, averaging periods, and emission factors), at the worst-case location were not modeled, the maximum onshore and Class I impacts may not have been provided. While worst case analyses are not required for NEPA analyses, given the above limitations, EPA recommends reporting the results of the modeling in relation to the appropriate reference indicators (i.e NAAQS and SILs), and limiting conclusions, such as "well within" and "will not" that would require additional analysis to substantiate.

USEPA-4

Mitigation-2.2.2 (pp. 2-6, 2-7)

The DSEIS does not address proposed or existing mitigation measures for air quality. The DSEIS indicates that air quality measures are included in the "120 standard mitigations."[7] However, as the air quality mitigation measures were not include in the original EIS or DSEIS, it is not possible to evaluate or provide meaningful comment on the effectiveness of the potential air quality mitigation measures that may be applied at the project level phase.

EPA provided a similar comment on the Western and Central Planning Areas Multisale DEIS (USEPA, February 13, 2012). BOEM's response to comments document indicated that air mitigation includes documentation of fuel use or run time, verification of emissions, monitoring of SO_x and NO_x emissions, and restrictions on flaring (*see response USEPA-2*). Mitigation

---

[5] DSEIS page 4-84
[6] DSEIS – page xi
[7] DSEIS page 2-7

USEPA-4

would typically include measures for avoiding, minimizing, reducing, or compensating, such as restrictions on flaring. Further explanation would be helpful to discern how the other referenced reporting and recordkeeping actions would provide mitigation for potential impacts.

While the BOEM has indicated mitigation measures are considered for venting and flaring, significant OCS project emissions come from combustion of diesel fuel in marine diesel engines. Mitigation could include such measures as use of low sulfur fuels, inherently lower polluting engine designs (i.e. use of tier certified non-road and marine engines vs. export engines), electrification of cranes and support equipment, fuel efficiency measures, and add on controls.

Finally, BOEM indicates that mitigations are typically only required for sources that exceed the exemption threshold. However, pursuant to the Council on Environmental Quality (CEQ) guidelines, all reasonable mitigation measures that could alleviate the environmental effects of a proposed action should be identified, even if the impacts would not be considered significant (Forty Questions 19 (a)). EPA recommends that the FSEIS include potential mitigation measures specifically for air pollution impacts, so that BOEM may receive meaningful feedback and input on the potential effectiveness and feasibility of such measures.

USEPA-5

Consideration of Climate Change and Greenhouse Gas (GHG) Emissions[8]

EPA recommends that the FSEIS include a discussion, per CEQ draft guidelines, on "the GHG emissions effects of the proposed and alternative actions", and on "the relationship of climate change effects to the proposed action or alternative, including the relationship to proposal design, environmental impacts, mitigation and adaptation measures." Per the draft guidance, if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO2-equavalent GHG emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public (CEQ; February 18, 2010). The high-case GHG emissions for single sales in the CPA and WPA are estimated in the DSEIS to be approximately 1,800,000 and 486,000 tons/year respectively (Tables A-3, A-4, Appendix A).

II. Appendix A: Air quality Offshore Modeling Analysis

EPA concurs with the BOEM's approach of conducting contemporaneous air quality impact modeling for the DSEIS based on proposed activities in the lease sale areas, in addition to Gulf wide studies. The following are general comments associated with the air quality modeling supporting this DSEIS. Specific comments of the more technical aspects of the modeling follow. Our EPA regional modeler can further address any questions regarding specific modeling issues in more detail.

---

[8] CEQ - Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions – February 18, 2010

USEPA-6

Representative vs. Worst-case Scenario

DSEIS does not use a "worst case" analysis, as inferred in Appendix A. While a worst case analysis is not required for NEPA, the DSEIS indicates that BOEM's stated objective is to determine "if the impacts from the proposed actions would significantly affect the environment, particularly public health and public welfare."[9] Given the range of lease block activities (e.g., Tables A-1 through A-4) and the locations of the sale lease blocks, the impact modeling cannot include all possible location/emission scenarios. Therefore, to ensure meeting the stated object that no scenario significantly affects the environment, EPA recommends the use of the most controlling scenario (i.e., scenario producing the worst-case impacts) in the ambient impact assessment supporting this DSEIS. The use of a representative scenario at a representative location would not adequately ensure no significant environmental impact. For example, the worst-case emissions would be pollutant and averaging period dependent (i.e., the Table A-5 annual average hourly values for the long-term standards and maximum hourly emission rates associated with each shorter-term standard). This level of analysis was not performed, therefore, EPA is concerned that the conclusions are not supported to the level inferred. EPA recommends that the conclusions reflect the limitations of the analysis, as discussed in the "conclusions" section above.

USEPA-7

Emissions Inventory for Modeling Analysis

The tables in Appendix A present the emission data used for the modeling analysis. The DSEIS notes that these emissions were generated by summing the emissions from all OCS activities listed on page 5 of Appendix A. Although, the calculations relied on the *Year 2008 Gulfwide Emission Inventory Study*, it is unclear how these emissions were estimated, for example, from hourly usage and emission factors or from emissions tests. A description, or a footnote, detailing the emission calculations would help clarify this analysis and is recommended for the FSEIS.

USEPA-8

Also, on this page, the DSEIS reports that a drillship generates 773 tons of NO_x per well. The EPA Region 4 has received several air permit applications with modeled emission calculations from drillships. The estimated emissions depend on the drillship type and the duration of the drilling project. Some of the emissions submitted to the EPA were close to the number referenced above; however, several were significantly higher than the estimated 773 tons per well, including estimates of NO_x emissions for a single well was high as 2,055.37 tons, (Eni US Operating Company). Based on the applications that EPA has received, it appears that the highest estimated emissions may be higher than those presented in the DSEIS.

Exemption Thresholds

The background of the Air Quality Modeling Analysis describes BOEM's use of a two-level hierarchy of evaluation criteria to evaluate potential impacts of offshore emission to onshore area, specifically the exemption level and significance level. The DSEIS on page A-3 states:

---

[9] DSEIS – Appendix A – page A-3

The initial evaluation compares the worst-case emissions to the BOEM exemption criteria. This corresponds to the USEPA screening step where the proposed activity emissions are checked against screening thresholds or "exemption levels." If the proposed activity emissions are below the exemption levels, then the proposed activity is exempt for further air quality review.

USEPA-9

The reference to the USEPA screening thresholds or exemptions levels does not appear to be an accurate characterization of EPA's air quality review, and EPA recommends that this analogy be removed. Neither EPA's OCS program, at 40 CFR 55, nor the onshore requirements have "exemption levels" analogous to the BOEM's rule whereby no further review is required. While not specifically stated, the BOEM appears to be drawing an analogy to the PSD significance impact levels (SILs). However, these "screening thresholds" are used to determine whether additional cumulative modeling is required. Full NAAQS and control technology evaluations, among other requirements, are still required for sources below these thresholds. In addition, sources not subject to PSD requirements, i.e. below the *major source thresholds*, are subject to air quality review and requirements, including Title V permitting, New Source Performance Standards (ie. emission limit and control technologies), and NESHAPs. In addition, minor source New Source Review, as well as applicable state and local State Implementation Plan requirements are applicable onshore, within state tidelands and for OCS sources under EPA's jurisdiction and within 25 miles of the state seaward boundary. For example, the OCS sources recently permitted by EPA offshore Alaska are below PSD major source thresholds. However, they received air quality review and analysis under the Title V program and state and local requirements, including an air quality modeling assessment for compliance with the NAAQS and permitting that incorporated emission limits, applicable control technologies, and public notice and comment.

USEPA-10

In addition, per our comments on the Multi-sale DSEIS, EPA continues to have concerns regarding the appropriateness of the BOEM emission exemption levels that are used as the first level of assessment. Since these are relied upon to ensure protection of onshore air quality and sources below this level are not typically subject to mitigation or monitoring requirements, EPA recommends that their appropriateness be explained.

1-hr NO_2 National Ambient Air Quality Standard (NAAQS)

The DSEIS implies that the 1 hr NO_2 NAAQS is specifically an EPA standard, and infers that it may not be applicable if other agencies, such as BOEM, are the regulatory authority that must ensure compliance with the NAAQS. For example, page A-7 indicates that BOEM does not the regulate 1-hr NO_2 NAAQS. Specifically, it is stated in the DSEIS that:

"BOEM does not regulate 1-hour NO_2. The 1-hour NO_2 standard is an USEPA standard."

While the CAA charges EPA with the adoption of the NAAQS, they are the *National* standards, which apply at the onshore receptor locations BOEM has chosen for the OCS modeling analysis. Hence, EPA concurs with BOEM that is necessary for the DSEIS to address the 1-hr NO_2

USEPA-11

standards, regardless of whether the Department of Interior (DOI) air quality regulations have been updated to include all the NAAQS and any corresponding Significant Impact Levels and/or Maximum Allowable Increases for Class I and Class II areas (increments). As discussed in the DSEIS, DOI is charged with implementation of the CAA and promulgation of the regulations for compliance with the NAAQS under the Outer Continental Shelf Lands Act, which would include the 1-hr NO_2 standard. EPA suggests that the above referenced language be revised to more accurately characterize the 1-hour NO_2 NAAQS.

USEPA-12

Modeled Impacts Evaluation Criteria

BOEM assessed the significance of potential lease activities impacts in the DSEIS by comparing the results of the BOEM OCD modeled onshore concentrations to BOEM's significant levels (BSL), and BOEM's maximum allowable increases (BMAI). [Note: The BSL are not provided and only the BMAI used in Tables A-6 through A-8.]. The modeled receptors are onshore, where federal NAAQS and state air quality standards and PSD increments apply. Hence, EPA recommends that the comparison tables in Appendix A include the applicable federal NAAQS and PSD increments, such that readers can evaluate the project emissions in light of these applicable standards/criteria (i.e. this is the information that would be the most relevant and helpful).

USEPA-13-16

EPA is also concerned that the scope of the NEPA analyses has been limited by the BSL and BMAI that are incorporated into the DOI air quality regulations for the purposes of plan reviews. As mentioned in the DSEIS, these regulations have not been updated to incorporate all applicable NAAQS. A review of the Class I and Class II area BMAI provided in Tables A-6, A-7, and A-8 indicates:

- With the exception of Class II annual NO_2, all BMAI are much larger than EPA's significant impact levels (SIL).
- There are no BMAI for PM2.5.
- The SO_2 BMAI are equal to the PSD increments, and the PM10 BMAI are larger than the PSD increments.
- There are no NO_2 and SO_2 1-hour BMAI.

USEPA-17

Based on these characteristics, the EPA SIL appears to be more appropriate target values for significant impact assessment, since these are the values that must be met by state, local and federal agencies at the location of the receptors. Since NEPA analyses are not constrained by DOI air quality regulations, and federal, State and local agencies will look to the EIS as a planning tool for ensuring compliance with the NAAQS and PSD increments, which are applicable onshore, EPA recommends that these values be included in the comparison table and addressed as relevant.

OCD Model Impact Assessment

The following comments are associated with the described OCD model impact assessment:

USEPA-18-24

- The OCD model has a 50 km applicability limitation (40 CFR 51, Appendix W). The appropriateness and conservative nature of this model for distances in excess of 50 km has not been demonstrated. EPA suggests that BOEM consider using CALPUFF, or another model designed for distances beyond 50 km.
- The specific meteorological data used in the modeling assessment were not provided or described. The large extent of the WPA and CPA would require the use of meteorological data from more than one location.
- The NAAQS, as defined, extend to each state's seaward boundary (i.e., generally 3 or 9 miles seaward of the shoreline). Therefore, the more appropriate nearest modeled receptor would be located along each state's seaward boundary, rather than onshore. The proposed lease sale areas include areas immediately adjacent to the state seaward boundaries. Projected impact assessments have not been provided for these areas.
- The specific modeled receptors and location of the modeled lease block activities should be provided in the FSEIS so that readers may understand the extent of the evaluation. EPA recommends including a figure of each planning area identifying the sale lease blocks and the locations of modeled activity emissions, receptors, and meteorological data stations.
- The OCD modeled emission sources and rates were not clearly described or provided. Yearly emissions from all the WPA and CPA were indicated to be summed together and modeled. The single sale project emissions were also indicated to be modeled. A clear description of the modeled emissions is needed as well as the specific OCD input emission parameters in order to determine the accuracy and limitations of the analysis, and hence, the extent to which results can be relied upon for necessary decisions and planning.
- The modeled scenarios provided in Table A-5 are the total emissions provided in the single sale from Tables A-3 and A-4. The values are annual average hourly emission rates, which are not necessarily appropriate for the short-term (i.e., 24-hour, hourly, etc) ambient NAAQS and BMAI.
- The reason the referenced ozone modeling studies are applicable to the current and anticipated total offshore oil and gas activities from both planning should be provided.

The following comments are associated with the provided OCD modeling results and conclusions (i.e., Tables A-6 through A-8):

Central Planning Area – Class I Area (Table A-6)

USEPA-25-26

- The EPA significant impact levels should be included in the comparison table. This is especially true because the receptors are located onshore where States and Federal agencies must comply with these increments and consider the impact of OCS sources in their permitting and planning.
- The modeled annual NO_2 and 24-hour PM2.5 concentrations are larger than EPA's SIL. EPA would consider these impacts to be significant for first level modeling and that cumulative PSD increment and NAAQS compliance modeling would be appropriate.

USEPA-27-28

- The 1-hour NO_2 concentration is about 29% of the NAAQS. This appears significant considering no other nearby offshore and onshore emission sources were modeled. Cumulative PSD increment and NAAQS compliance modeling would be appropriate in order for the BOEM to make the claim that the projects are expected to have "minimal impacts onshore, and are expected to be well within the NAAQS."
- The footnote to Table A-6 indicates "No background concentration available for Breton National Wilderness area." EPA believes the air quality section of the Fish and Wildlife Service, which maintains the monitors on at Breton, has this data. Please contact EPA Region 4 or 6 if you need further assistance in obtaining the background data.

USEPA-29-31

Central Planning Area – Class II Area (Table A-7)

- The EPA significant impact levels should be included in the comparison table, as discussed above.
- Because the modeled concentrations provided are only associated with a single sale and not all other offshore and onshore emission sources, the modeled values much smaller than the NAAQS do not assure no modeled NAAQS violations.
- The 1-hour NO_2 modeled value is about 44% of the NAAQS. This appears to be significant because no other nearby offshore and onshore emission sources were modeled. The ambient monitored concentration added to the modeled value was from a Louisiana monitor that may not be appropriate for all multiple state receptors. Therefore, the conclusion that sum of the monitored and modeled concentration does not exceed the NAAQS in the entire CPA Class II area has not been demonstrated.

USEPA -32

Western Planning Area – Class I Area

- The statement (page A-7) that the 1-hour NO_2 impact assessment shows no NAAQS exceedances for Breton National Wilderness Area is inconsistent with the statement that no PSD Class I area impact assessment was performed for the WPA.

USEPA-33-34

Western Planning Area – Class II Area (Table A-8)

- The EPA significant impact levels should be included in the comparison table.
- Because the modeled concentrations provided are only associated with a single sale and not all other offshore and onshore emission sources, the modeled values much smaller than the NAAQS do not assure no modeled NAAQS violations. The 1-hour NO_2 modeled value is about 14% of the NAAQS. This appears to be significant because no other nearby offshore and onshore emission sources were modeled. The ambient monitored concentration added to the modeled value was from a Louisiana monitor that may not be appropriate for the multistate receptors in this planning area. Therefore, the conclusion that sum of the monitored and modeled concentration does not exceed the NAAQS in the entire WPA Class II area has not been demonstrated.

WETLANDS AND COASTAL AREAS (page 4-18)

EPA comment:
This section references a previous EIS and states that "No new significant information was discovered that would alter the impact conclusion for wetlands…"

USEPA-35

Recommendation:
EPA recommends providing a summary of what the impact conclusions were in the multisale EIS document referenced.

EPA comment:
General descriptions, using terms such as "negligible" and "minimal" indicate trends only and are insufficient for the reader to ascertain that there really are no significant impacts to wetlands. There is no explanation that establishes the potential context and intensity of potential impacts, and no specific quantifying data to help the reader understand why there will be only low, negligible, or minimal impacts to wetlands.

USEPA-36

Recommendation:
Analysis of effects should use specific data and information, not subjective general forecasting. In general, there is no quantified data used to support any of the assertions of low, negligible, or minimal impacts.

EPA comment:
On page 4-18 it states "Wetland impacts from offshore spills would be minimized due to the distance of wells and production facilities to the coastal wetlands." This sentence seems to conclude that the greater the distance from the coast the less likely oil spills would be to impact coastal wetlands; however, without specific data or examples, impacts to coastal wetlands cannot be determined. Page 4-18 also states "if an inland oil spill related to the WPA proposed action occurs, some impact to wetland habitat would be expected."

USEPA-37-38

Recommendation:
- Please include what distance that is and at what distance impacts be felt and/or minimized.
- The word "some" is not quantifiable. Impacts should be defined and quantified with ample data to prove what those impacts are projected to be.

EPA comment:
(Regional Director's Note, page xii) - This section states that "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 conditions of net land building to one of net landloss [sic], particularly in Louisiana." The next sentence seems to contradict the previous statement: "The incremental contribution of the…proposed action to the cumulative impacts on coastal wetlands is expected to be small."

USEPA-39

Recommendation:

- Because oil and gas development activity in the Gulf necessitates onshore infrastructure; pipeline construction and other related construction activity should be identified as one of these 'human activities' which has contributed to land loss.

EPA comment:

On page 4-19, the EIS states that …"modern construction techniques…would result in zero to negligible impacts…because modern techniques avoid wetlands through selection emplacement in existing corridors, directional drilling to avoid additional trenching, and required restoration and revegetation techniques." Wetlands staff regularly review permit applications for oil and gas development infrastructure necessary for offshore drilling, such as ring levees, pipelines, access roads, etc. under CWA Section 404 (dredge/fill wetlands), which frequently do have wetland impacts of varying size. Following the Section 404(b)(1) Guidelines which state that a project cannot be permitted unless it is the least environmentally damaging practicable alternative, the EPA and other resource agencies frequently make comments to recommend that the applicant examine alternatives which would minimize impacts to wetlands and other aquatic sites. For this EIS to state that simply because "modern construction techniques" are utilized by the oil and gas industry, there would be "zero to negligible impacts" in wetlands is not borne out by review of oil and gas development project applications on Public Notice under the Section 404 program.

On page 4-19, the DSEIS references "a condition of net landloss" [sic] and notes that "Wetland loss is also expected to continue in coastal Texas but at slower rates." In addition, the DSEIS refers to "a detailed analysis of the cumulative impacts" which can be found in the earlier EIS.

USEPA-40

Recommendation:

Citations to reference should be included as well as specific data on what the "slower rates" are being compared to. This section should also include a brief summary of the cumulative impacts analysis.

OIL SPILL ANALYSIS

Under section 3.2.1.8 – Risk Analysis by Resource - it is stated that "Coastal spills are estimated from historic counts; the estimate is not a rate tied to an anticipated production volume or probability."[10] BOEM then indicates that a detailed discussion for risk analysis by resource from offshore oil spills is provided in Chapter 3 of the multisale EIS.

USEPA-41

Recommendation:

EPA recommends providing additional detail in the FSEIS regarding the methodology for estimating coastal spills and the estimated number of spills that would be expected with the proposed actions.

---

[10] DSEIS page 3-16

ENVIRONMENTAL JUSTICE (starting page 4-71 and 4-162)
The DSEIS contains information indicating that the proposed project is not expected to have disproportionately high or adverse environmental or health effects on minority or low-income people. The infrastructure support system for oil- and gas-related industry is highly developed, widespread, and has operated for decades within a heterogeneous Gulf of Mexico population. However, EPA believes that the potential impacts to communities (low income, minority, and Tribal) that rely on subsistence hunting and fishing should be addressed in more detail. Lastly, EPA is unclear on why BOEM included information regarding the *Deepwater Horizon* Economic and Property Damages Settlement in the EJ sections for both Alternatives.

USEPA-42

Recommendation:
Although the DSEIS mentions subsistence fishing uses by the community and ongoing monitoring and research activities related to the Deepwater Horizon event, it does not include information on outreach to the community to inform them of research and monitoring results and what those results mean to subsistence hunting and fishing conditions. The FSEIS should include a plan to supplement local subsistence hunting and fishing in the event of an accidental release from the leases described in the proposed project alternatives. Lastly, the FSEIS should include a discussion of how the *Deepwater Horizon* Economic and Property Damages Settlement is related to EJ communities impacted by the proposed action.

USEPA-43

MITIGATION (page 2-5)
EPA recommends including additional information in the FSEIS regarding mitigation for the projected types of impacts on coastal resources. It would be appropriate to include a commitment to fully mitigate and/or compensate for all unavoidable losses of coastal resources, as well as for the physical, chemical, and biological functions and ecological services they provide. A statement of policy requiring that all leaseholders avoid, minimize, and fully mitigate unavoidable losses would be appropriate. Similarly, an explanation should be provided of the approach to be taken with regard to the timing of implementing mitigation measures relative to exploration and production activities.

NATIONAL HISTORIC PRESERVATION ACT (page 5-10)
It is beyond the scope of a general Tribal review in the context of NEPA to identify what specific treaties, laws, trust responsibilities and other duties may be applicable. Rather, this Tribal review looks at the NEPA document to determine whether it appears to contain adequate information to document that: 1) potentially affected Tribes, tribal resources and citizens were identified, and 2) appropriate contact was made with the Tribal officials of potentially affected Tribes (beyond the narrow context of working with THPOs or SHPOs on issues related to historic properties (NHPA), or 3) that the agency otherwise concluded that there were not tribes or tribal resources that would be affected and there was no need for such contact or consultation.

The DSEIS indicates that some tribes may be affected but fails to provide complete information to determine if all tribes potentially affected have been identified and contacted. Due to the

USEPA-44

nature of the project, it appears that the proposed project could affect tribal resources (including natural resources), citizens or government services. EPA recommends that the following actions be taken by DOI: 1) identify all potentially affected tribes, resources, (including those used for subsistence) and tribal communities; 2) identify potentially applicable treaties, laws, policies, legal responsibilities, and duties; and 3) contact and, as appropriate, initiate consultation with Tribes concerning the potential effects of the proposed action.

Recommendation:

USEPA-45

- The DSEIS states that no known historical properties will be affected by the proposed activities and that consultation is unnecessary (Chapter 5.8). However, the State of Louisiana recognizes several Tribal Governments whose members reside, and in many cases, derive their livelihood fishing the coastal waters of Louisiana. Within portions of the project area, there reside an estimated 36,000 Tribal Peoples, who historically used and continue to use the Louisiana coastal waters and estuaries as a means of livelihood and subsistence. While consultation with these tribes is not required due to their non-federal recognition status, coordination between BOEM, the State of Louisiana, and the Tribes regarding the potential effects of the proposed project alternatives on natural resources (especially those used for subsistence) and potential cultural sites associated with these Tribes (The United Houma Nation, Point Au Chien Tribe, Isle de Jean Charles Band, Grand Caillou/Dulac Band, and the Biloxi-Chitimacha Confederation/Bayou Lafourche Band) should be included in the FSEIS.

USEPA-46-47

- Oil from past leaks and disasters as well as coastal erosion from hurricanes and shoreline development may have affected some Tribal fishing areas and inland wetlands. Plants used in traditional medicines and other traditional practices may also be affected as well as other cultural sites sacred to these Tribes. The FSEIS should describe these existing resources and the potential impacts to the resources from the proposed project alternatives.

- Coordination should be undertaken with Federally Recognized Tribes with historical ties to the Texas coastline.

CONSULTATION AND COORDINATION

Chapter 5 provides a description of how the proposed actions were noticed to the public, tribes, and other agencies. It also provides a summary of scoping comments, however there was no analysis of the number of comments received and if there was a focus or concentration area of the comments received.

USEPA-48

Chapter 1 under the section titled "Measures to Enhance Transparency and Effectiveness in the Leasing and Tiering Process" BOEM provides a description of a process that will improve the public's ability to comment and provide information in the prelease sale planning process. EPA commends BOEM's efforts to enhance the public's opportunities in the permitting and NEPA process, however this section should provide additional details on what steps BOEM will be taking to enhance the public's commenting opportunities for the prelease sale planning process.

Recommendation:

USEPA-49-50

- EPA recommends that the FSEIS include an analysis of comments received on the DSEIS that organizes the comments by resource area and provides the reader an understanding of how many comments were received for each resource area. In addition, this strategy is recommended for addressing comments in future NEPA documents.
- EPA recommends providing additional detail in the FSEIS regarding BOEM's efforts to improve the public's ability to comment and provide information in the prelease sale planning process.

Region 4 Contacts:
Dan Holliman – Region 4 NEPA Program Office – Holliman.Daniel@epa.gov
Kelly Fortin – Region 4 Air Division – Fortin.Kelly@epa.gov
Karrie-Jo Shell – Region 4 Water Protection Division (NPDES) – Shell.Karrie-Jo@epa.gov
Rosemary Hall – Region 4 Water Protection Division (Wetlands) – Hall.Rosemary@epa.gov

Region 6 Contacts:
John MacFarlane – Region 6 NEPA Program – MacFarlane.John@epa.gov
Barbara Keeler - Region 6 Water Quality Division (Marine and Coastal) - Keeler.Barbara@epa.gov
Barbara Aldridge – Region 6 Water Quality Division (Marine and Coastal) – Aldridge.Barbara@epa.gov
Sharon Osowski – Region 6 Office of Environmental Justice and Tribal Affairs – Osowski.Sharon@epa.gov
Jeffrey Riley – Region 6 Multimedia Planning and Permitting Division (Air Planning) – Riley.Jeffrey@epa.gov

USEPA-1 Information regarding resource estimates that could be developed under Alternative B were previously provided in **Chapters 2.3.2 and 2.4.2**. The numerical range of resource estimates was added to **Chapters 2.2.1.1 and 2.2.1.2** for clarity.

USEPA-2 We appreciate USEPA's comments on onshore ozone impacts from OCS oil and gas activities. Those unpublished references are listed at the end of **Appendix A**, which explains from emissions inventory data analyses and modeling methods that "OCS activities contribute only slightly to onshore ozone exceedances." For instance, Yarwood et al. (2004) used a photochemical model to analyze the 2000 GWEI and selected the Houston-Galveston-Brazoria nonattainment area since it has the most severe ozone problem in the Gulf of Mexico region (System Applications International et al., 1995). One of the main relevant findings in Yarwood et al. (2004) is as follows: "The average impact of the 2000 GWEI emissions on 8-hour ozone levels above 85 ppb in Houston area is 0.2 ppb; although larger impacts may occur over the Gulf of Mexico." On the other hand, Haney et al. (2008) performed a modeling investigation using the 2000 and 2005 GWEI's in the WPA and CPA to evaluate the impact of offshore emissions on offshore and onshore ozone air quality. Haney et al. proposed an emission-reduction scenario and found for a particular ozone episode that the onshore impact from all offshore oil-and-gas-related sources is small, but generally larger than those estimates using the 2000 inventory. They noticed higher simulated ozone concentrations from 2005 emission due to increases in NO_x and VOC concentrations. Clarifying language has been added, where appropriate, to this Supplemental EIS in response to USEPA's comment.

USEPA-3 BOEM is in the process of a comprehensive assessment of numerical methods (including a variety of sensitivity analyses, a comparison of emission inventories, and an evaluation of emission scenarios) using USEPA-approved models, which will support our scientific analyses in future EIS's. This modeling assessment is important considering that modern air quality models are still in development and need to be evaluated before they are widely used for realistic estimations of pollutant concentrations over offshore and coastal environments. Particular attention will be provided to resolve the issues in sensitive Class I and II areas.

USEPA-4 Comment noted. Chapter 2.2.2 describes the mitigation measures applied to avoid or minimize environmental and socioeconomic impacts related to OCS activities. Mitigating measures are an integral part of BOEM's program to ensure that the operations are always conducted in an environmentally sound manner (with an emphasis on minimizing any adverse impact of routine operations on the environment). As part of the staged decisionmaking under OCSLA, air quality mitigations are typically applied at post-lease stages, where additional site-specific information is provided. Examples of air quality mitigations applied to specific permits and approvals can be found on BOEM's website at http://www.data.boem.gov/homepg/data_center/plans/plans/master.asp.

USEPA-5 This Supplemental EIS updates the baseline conditions and potential environmental effects since the publication of the 2012-2017 WPA/CPA Multisale EIS for a single proposed lease sale (in each of the WPA and CPA). BOEM has included modeled estimates for certain greenhouse gases that maybe directly emitted during OCS oil and gas activities in **Chapters 4.1.1.1 and 4.2.1.1 and in Appendix A**. At this time, the greenhouse gas emissions related to OCS oil and gas activities are a very small percentage of national emissions, and it would be impossible to tease out the impacts from this small incremental addition from global climate change impacts attributable to all other global sources.

USEPA-6 As the USEPA's comment acknowledges, NEPA does not require a worst-case analysis. Nevertheless, BOEM's subject-matter experts have provided an overly conservative approach to modeling reasonably foreseeable impacts (including, but not limited to, aggregating all emissions sources to one location, which would not be expected in a real-world scenario). BOEM continues to believe this is the most appropriate approach to meet the Agency's NEPA obligations.

USEPA-7 Billings et. al. (official communication, 2012) prepared emissions estimates (criteria and greenhouse emissions) for BOEM's propsed EPA Lease Sales 225 and 226 based upon low and high scenarios provided by BOEM for a "typical" lease in the EPA. Billings et al. (official communication, 2012) adjusted a spreadsheet provided by BOEM to reflect the "level of effort" for each year's activity over a 40-year period. Because the calculations used for emissions estimates is nonspecific (generic) among the planning areas, the methodology used by Billings et al. (official communication, 2012) to calculate emissions in the EPA was also used to calculate emissions estimates for the WPA and CPA. The low and high scenarios for a typical WPA and typical CPA lease sale were inserted into the spreadsheets updated by Billings et al. (official communication, 2012).

USEPA-8 As noted in the response to comment USEPA-6, NEPA does not require a worst-case analysis. The data in the Supplemental EIS spreadsheets were based on an average drillship as reported by the *Year 2008 Gulfwide Emission Inventory Study* (Wilson et al., 2010) and Rigzone (2009) for the Gulf of Mexico. Drilling days and average kilowatts were used to calculate reasonably foreseeable emissions. Specific drillships can be significantly larger or smaller than the average value used in the spreadsheet, and greater total emissions could be generated if the drillship stays on location longer. Nevertheless, BOEM's subject-matter experts believe that the analysis remains conservative with regards to reasonably foreseeable emissions expected to result from the WPA and CPA proposed actions. Therefore, BOEM determined that no revisions to the document are necessary with regard to the emission estimates used.

USEPA-9 As recommended by USEPA, BOEM will remove the analogy comparing the screening thresholds of the two agencies.

According to BOEM's regulations (30 CFR 550), if the projected emissions are less than or equal to the emission exemption amount for the air pollutant, the facility is exempt from further air quality review. Likewise, if the facility is not exempt , the lessee shall use an approved air quality model to determine whether the projected emissions for those air pollutants from the facility result in an onshore ambient air concentration above the significance levels (30 CFR 550.218(e)).

Although both agencies conduct air quality reviews on activities on the OCS, BOEM has its own regulations in place to review OCS activities west of longitude 87º30″. Additionally, in 1980, BOEM adopted the PSD significance levels and included them into BOEM's regulations.

USEPA-10 Comment noted. However, USEPA's thoughts on the appropriateness of BOEM's emission exemption levels are outside the scope of this NEPA document and the proposed action evaluated herein.

USEPA-11 Comment noted. The text of this Final Supplemental EIS has been revised to address the comment.

Please note, however, that DOI does not "implement" the Clean Air Act on the OCS. The DOI implements OCSLA on the OCS and the air quality requirements found therein.

USEPA-12 Comment noted. Although NEPA does not require a regulatory proxy for the determination of the significance of an impact, for the sake of comparison, the U.S. Environmental Protection Agency's SIL's were added to the comparison tables. BOEM's subject-matter experts determined that the modeled impacts were below the U.S. Environmental Protection Agency's SIL's.

USEPA-13 BOEM's regulations do not include NO_2 levels in the Maximum Allowable Increase tables; only TSP or SO_2. As indicated on each table with an asterisk, USEPA has an SIL for NO_2 as part of the robust analysis before the decisionmaker.

Additionally, USEPA indicates that BOEM's Maximum Allowable Increases are much larger than the U.S. Environmental Protection Agency's SIL's. Regardless, the modeled concentrations shown on the tables in Appendix A are much less than the U.S. Environmental Protection Agency's SIL's, which are now included on the tables.

USEPA-14 As indicated in Appendix A of the Draft Supplemental EIS, the original USEPA particulate standard was for total suspended particulates (TSP), which BOEM adopted. Although the USEPA's standard has been replaced with the PM_{10} and $PM_{2.5}$, BOEM's regulations continue to include TSP. For modeling purposes, BOEM modeled $PM_{2.5}$ and $PM_{10.}$ and compared modeled impacts with the U.S. Environmental Protection Agency's SIL's shown in **Table A-6**.

USEPA-15 Comment noted. BOEM's regulations do not necessarily equate its Maximum Allowable Increases with USEPA's increments or SIL's. However, BOEM's modeled results have been compared with the U.S. Environmental Protection Agency's SIL's shown in **Table A-6**, and the results have been further discussed in **Chapter 4 and Appendix A**.

USEPA-16 Comment noted. As mentioned in the air quality analysis, BOEM's regulations do not include NO_2 concentration values in the Maximum Allowable Increases. However, the TSP annual and 24-hour concentrations values and the SO_2 annual, 24-hour, and 3-hour concentrations values are included in the Maximum Allowable Increases. BOEM's regulations do not include a 1-hour SO_2 Maximum Allowable Increase.

BOEM's modeled impacts include averaging times for NO2, SO2, PM2.5 and PM10, and CO. In Table A-6, BOEM's modeled impacts have been compared with BOEM's Significance Levels, BOEM's Maximum Allowable Concentration Increases, the U.S. Environmental Protection Agency's SIL's, and the NAAQS.

USEPA-17 BOEM appreciates USEPA's comments. However, NEPA does not mandate a specific regulatory proxy for evaluating whether a proposed action may result in significant impacts, and BOEM believes it would be confusing to the decisionmaker and the public to ignore BOEM's regulations when evaluating onshore impacts.

BOEM compared the modeled impacts with the U.S. Environmental Protection Agency's SIL's and discussed the results in Chapter 4 and Appendix A. Therefore, as discussed in this Supplemental EIS, BOEM stands by the conclusion that the WPA and CPA emissions that may actually result from the proposed actions would be expected to minimally impact onshore air quality.

USEPA-18 BOEM acknowledges that every available air quality model has benefits and limitations. As noted in **Chapter 4 and Appendix A**, BOEM's subject-matter experts determined that the OCD model was one of the few to be viable for use in offshore environments and that it would produce more conservative results (i.e., tend to overestimate impacts) than other available models. Nevertheless, while it is true that the OCD model has a 50-km (31-mi) applicability limitation, this Supplemental EIS has demonstrated that the receptors within 50 km (31 mi) of the proposed lease sale are within acceptable limits, even accounting for the OCD's conservative nature.

USEPA-19 Meteorological data used were from the period 2000 through 2004. Different meteorological data were applied to each site. For East Breaks Block 446, the meteorological data were from Corpus Christi, Texas, for both surface and upper air, as well as from Buoy 42019. For Mississippi Canyon Block 856, surface data come from Patterson, Louisiana, and upper air

data come from Slidell, Louisiana. Buoy data for Mississippi Canyon Block 856 come from Buoy 42040. These meteorological data points are the closest, physically, to the proposed lease sale areas available to BOEM and, therefore, are the best approximation available.

USEPA-20 As noted above, NEPA does not mandate a specific regulatory proxy for the nature and scope of significant impacts that may result from a proposed action. Although the NAAQS extend to the State seaward boundary, BOEM's regulations at 30 CFR 550.303 state that the proposed activities should be reviewed for their potential to affect the air quality of an onshore area; therefore, onshore receptors rather than receptors at the State's seaward boundary were selected. In any event, there is no evidence to suggest the impacts at the seaward boundary, only approximately 3 mi (5 km) from the coast, would have impacts significantly different than the onshore receptors used by BOEM for modeling. BOEM's subject-matter experts believe that the onshore receptors used are the most appropriate for evaluating potential impacts under NEPA.

USEPA-21 BOEM has included the location of the modeled lease block activities and the location of meteorological data and buoy data in **Chapter 4 and Appendix A**.

USEPA-22 Refer to the response to comment USEPA-7.

USEPA-23 Due to limitations in the model, and in the very nature of estimating potential impacts for a proposed lease sale, BOEM acknowledges that the values may not be ideal for short-term modeling. Nevertheless, BOEM's subject-matter experts used conservative assumptions throughout the determination of emissions rates, thereby considering the rates to be an adequate surrogate for short-term emission rates for purposes of this NEPA analysis. These conservative assumptions include the use of the highest estimated level of activity, using the year with the most activity out of the 40-year life of the lease, and the placement of total emissions throughout the planning area into a single block (rather than being scattered through the planning area as would be expected in real-world scenarios).

USEPA-24 As noted in this Supplemental EIS, the referenced ozone modeling studies are applicable to these proposed lease sales because the amount of emissions generating activity utilized in the studies remains roughly consistent with the various activities proposed during the 40-year life of expected leases resulting from proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231. Drilling is a temporary activity and as drilling concludes at older leases, new drilling starts up on other existing or recently obtained leases. However, in the past several years, there has been a downward trend in drilling activity and that trend is expected to continue as industry uses more focused drilling and fewer wells to produce equivalent or greater amounts of product. As production slows down at older platforms, new production platforms go online. As activity moves into deeper water, all this activity moves farther away from the shore, lessening shoreline impacts. This information on activity levels is provided in **Chapter 3**.

USEPA-25 Comment noted and BOEM has added the U.S. Environmental Protection Agency's SIL's to the table. As shown in **Table A-6**, BOEM's modeled impacts are much less than the U.S. Environmental Protection Agency' SIL's. Therefore, BOEM stands by the conclusion that the emissions reasonably foreseeable as a result of the proposed CPA lease sale would minimally impact onshore air quality.

USEPA-26 Refer to the response to comment USEPA-17. The impacts of the OCS emissions on the onshore air quality are below BOEM's Significance Levels and the NAAQS. The USEPA commented that BOEM should compare model results with the U.S. Environmental Protection Agency's SIL's. Therefore, the modeled results have been compared with the U.S. Environmental Protection Agency's SIL's. The modeled impact in the Class I area for annual NO_x equals 0.4 $\mu g/m^3$ and the U.S. Environmental Protection Agency's SIL for annual NO_x equals 0.1 $\mu g/m^3$. The modeled impact in the Class I area for 24-hour $PM_{2.5}$ equals 0.3 $\mu g/m^3$

and the U.S. Environmental Protection Agency's SIL for $PM_{2.5}$ equals 0.07 µg/m^3. Although the SIL's were exceeded, BOEM expects, in practice if the emissions were distributed more realistically across the CPA, that emissions would not exceed the SIL. 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 Mississippi Canyon Block 856.

USEPA-27 Refer to the response to comment USEPA-17. BOEM's subject-matter experts determined the modeled impacts by adding the modeled concentration to Kenner, Louisiana, 1-hour NO_2 monitor background (94.07 µg/m^3) and compared with the NAAQS. The subject-matter experts believe that this approach remains conservative in evaluating the potential impacts under NEPA.

USEPA-28 BOEM contacted FWS's National Wildlife Refuge System, Branch of Air Quality. The FWS confirmed that they do not have this data. The USEPA was contacted for assistance in obtaining the background data, but the data were not received as of publication of this Final Supplemental EIS. Although this information may be relevant to reasonably foreseeable significant impacts, the information is not essential to a reasoned choice among alternatives. Even if it were, as FWS does not have the data despite it maintaining the monitors at the Breton National Wilderness, and USEPA has been unable to provide it; it is believed it is not possible to obtain the information at this time. Regardless, the robust analysis of air quality impacts in **Chapter 4**, coupled with the modeling analysis summarized in **Appendix A**, provide ample information on the potential for reasonably foreseeable impacts that may result from the proposed action for the decisionmaker and the public in evaluating the potential environmental consequences.

USEPA-29 Refer to the response to comment USEPA-17. Although the SIL's were exceeded, BOEM expects in practice if the emissions were distributed more realistically across the CPA that emissions would not exceed the SIL. 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 Mississippi Canyon Block 856.

USEPA-30 Refer to the response to comment USEPA-24. Yearly emissions from all of the following activities and sources were summed together and modeled: exploration and delineation drilling; development and production drilling; platform installation and removal; pipeline installation; production platform operations; tanker loading; tanker in transit; tanker unloading; and helicopters and support vessels. Many of the more pollutant-emitting activities (such as drilling) remain relatively constant from year to year due to the limited availability of equipment to perform this work in the Gulf of Mexico. Other factors are currently leading to a downward trend in activities (e.g., the number of wells drilled) over the last few years, and this trend may continue. BOEM believes that the approach used in this Supplemental EIS was reasonably conservative and was appropriate for the evaluation of the proposed action under NEPA.

USEPA-31 Since the Kenner, Louisiana, monitor is located within the CPA, BOEM believes it is an appropriate monitor to use to evaluate potential impacts on the NAAQS within the CPA. BOEM reviewed the Houston, Texas, 1-hour NO_x monitoring data and, because it was similar to the Kenner data, decided to use the Kenner, Louisiana, data throughout for the sake of consistency

USEPA-32 Comment noted. The text of this Final Supplemental EIS has been revised to address the comment.

USEPA-33 Refer to the response to comment USEPA-17. As shown in **Table A-8**, BOEM's modeled impacts are less than the U.S. Environmental Protection Agency's SIL's. Therefore, BOEM

stands by the conclusion that the WPA emissions would be expected to only minimally impact onshore air quality.

USEPA-34 Refer to the response to comment USEPA-30.

USEPA-35 The summary of the impact conclusions are included in this Supplemental EIS for each resource within **Chapters 4.1 and 4.2**. Impact conclusions for the WPA and CPA proposed actions are also summarized in Chapters 2.3.1.2 and 2.4.1.2 of the 2012-2017 WPA/CPA Multisale EIS. Full impact descriptions are also provided in the 2012-2017 WPA/CPA Multisale EIS. The referenced 2012-2017 WPA/CPA Multisale EIS will be included on the CD with the Final Supplemental EIS.

USEPA-36 Refer to the response to comment USEPA-35. This Supplemental EIS tiers off of the referenced 2012-2017 WPA/CPA Multisale EIS and is therefore focused on any changes that may have occurred to the resources that could be impacted or any new information that has become available since the publication of that document. Quantified data are used to support the conclusions for resource analyses in the 2012-2017 WPA/CPA Multisale EIS. For example, refer to the wetlands analyses in Chapter 4.2.1.4.2 of the 2012-2017 WPA/CPA Multisale EIS.

BOEM offers the following two examples of quantifiable data included in the 2012-2017 WPA/CPA Multisale EIS:

"The use of modern technologies, such as directional boring, greatly reduces and possibly eliminates most impacts to coastal wetlands and marshes. About 5-8 ha (12-20 ac) of landloss for the projected 2 km (1.2 mi) of pipeline (based on historic loss rates) are expected from a CPA proposed action. This represents approximately 0.25 percent of the total landloss estimated to occur along the Louisiana coast in 1 year (~2,590 ha or 10 mi2) (Barras et al., 2003)."

"All estimated navigational use is expected to contribute approximately 1.5 m/yr (4.9 ft/yr) to the widening to the roughly 2,000 km (1,243 mi) of unarmored navigation channels used by OCS Program-related vessels, or about 300 ha/yr (741 ac/yr) of landloss per year (Johnson and Gosselink, 1982)."

USEPA-37 The OCS wells and production facilities off the Texas coast are at least 9 nmi (10.35 mi; 16.66 km) from land and are as far as over 200 mi (322 km) from land. Spills could take place at any of these facilities, and impacts to wetlands would vary based on a number of factors, including distance and the quantity of oil spilled. Specific data, including historical rates of spills by volume ranges, risk analysis for offshore spills, and modeled probabilities of oil spills reaching shorelines, are provided in Chapters 3.1.1.7.4 and 3.2.1 of the 2012-2017 WPA/CPA Multisale EIS, which are hereby incorporated by reference.

USEPA-38 The example of the *Deepwater Horizon* explosion, oil spill, and cleanup was used in Chapter 4.2.1.4.1 of the 2012-2017 WPA/CPA Multisale EIS to describe the impacts to wetlands of that particular spill. Chapter 4.1.1.4.3 of the 2012-2017 WPA/CPA Multisale EIS discusses the probabilities of a hypothetical spill ≥1,000 bbl reaching shore in Texas (under the OSRA model) and reviews recent scientific literature regarding primary and secondary impacts of oil on wetlands. Impacts of future spills cannot be precisely quantified without knowledge of the volume, type of oil, distance from impacted wetlands, spill-response actions, and other factors.

USEPA-39 Chapter 4.1.1.4.4 of the 2012-2017 WPA/CPA Multisale EIS identifies dredging, navigation channels and canals, pipelines, oil spills, and development of wetlands as the "main factors that continually effect wetlands." As noted above, the 2012-2017 WPA/CPA Multisale EIS is hereby incorporated by reference. The reason the proposed action is expected to have a

small incremental contribution to cumulative impacts to wetlands is that the WPA proposed action represents only a small (<5%) portion of the OCS oil and gas program's impacts on wetlands, and wetlands are also impacted by non-OCS impacts such as State oil and gas activity, development, natural processes, navigation, and and sea-level rise, among others. The existing and potential onshore activities related to OCS oil and gas program and the WPA proposed action were included by BOEM in this analysis of the cumulative impacts.

USEPA-40 Comment noted. The text of this Final Supplemental EIS has been revised to address the comment.

USEPA-41 Additional detail regarding the methodology and the source of data used in estimating the number and size of potential future coastal spills is provided in Chapter 3.2.1.7.1 of the 2012-2017 WPA/CPA Multisale EIS. Offshore spill risk related to the proposed action is addressed in **Chapter 3.2.1.8** of this Supplemental EIS. Spills occurring as a result of the proposed action are anticipated to occur in offshore waters where most of the activities related to these proposed actions will take place. The referenced 2012-2017 WPA/CPA Multisale EIS will be included on the CD with this Final Supplemental EIS.

USEPA-42 The USEPA's suggestion to provide community outreach or to include within its environmental impact documents "a plan to supplement local subsistence hunting and fishing in the event of an accidental release" is outside of the scope of this Supplemental EIS and this Agency's mandate under NEPA, although BOEM notes that such activities were considered and undertaken by various agencies and industry after the *Deepwater Horizon* explosion and oil spill. The 2012-2017 WPA/CPA Multisale EIS, from which this Supplemental EIS tiers, states that BOEM is currently funding a subsistence study to better document subsistence in the region. In previous years, prior to the *Deepwater Horizon* explosion, oil spill, and cleanup, subsistence living along the Gulf Coast was not a major consideration. The *Deepwater Horizon* oil spill, however, brought the issue to the forefront, and BOEM funded a subsistence study after the oil spill to explore this new focal area. This information was part of the 2012-2017 WPA/CPA Multisale EIS. However, information has been added to **Chapters 4.1.1.20.4 and 4.2.1.23.4** of this Supplemental EIS to reinforce the information. For environmental justice evaluations under NEPA, the issue is whether minority and low-income groups suffer disproportionate environmental effects. Not only is there no evidence to suggest that these persons were disproportionately affected, there is no evidence yet that revealed that minority and low-income populations are greater subsistence consumers than any other people in the region. That is, their rate of subsistence consumption has not been shown to be higher than persons who are not minority or low income.

There are no clearly discrete, identifiable, or recognized "environmental justice communities" in the impact area. The Deepwater Horizon Economic and Property Damages Settlement includes subsistence claims and is therefore relevant to this Supplement EIS document and it is also informative for any people who read this Final Supplemental EIS. Information has been added to Chapters 4.1.1.20.4 and 4.2.1.23.4 to highlight the relevance of the Settlement to any potential minority and low-income persons who wish to file a claim or who already filed a claim under the Gulf Coast Claims Facility and who need to re-file under the new Settlement program.

USEPA-43 It is important to point out that BOEM only permits infrastructure emplaced on the OCS, and infrastructure constructed in onshore coastal areas are permitted by the States pursuant to their Coastal Use Programs and by Federal agencies such as the U.S. Army Corps of Engineers pursuant to the Clean Water Act. For many of these agencies, mitigation can be and frequently is required for approvals or permits under their authority.

BOEM has incorporated into this Supplemental EIS relevant discussions on mitigations, and any Record of Decision issued as part of the NEPA process for this proposed action shall include CEQ's requirements for mitigation under 40 CFR 1505.2. Nevertheless, USEPA's

request for a broad policy statement requiring extensive and complete mitigation of coastal resources is outside of the scope of this NEPA process. Please note as well that BOEM's authority to require mitigation is limited and that the Agency has no or limited authority to provide or mandate compensatory mitigation for activities regulated by other State and Federal agencies.

USEPA-44 **Chapter 5.8** has been updated to elaborate on the National Historic Preservation Act's consultation efforts undertaken to date. In November 2010, BOEM (then BOEMRE) initiated a request for consultation via a formal letter sent to the affected Gulf Coast States and Tribal Nations. Letters were sent to each of the following federally recognized Tribal Nations: Alabama-Coushatta Tribes of Texas; Chitimacha Tribe of Louisiana; Choctaw Nation of Oklahoma; Coushatta Indian Tribe; Jena Band of Choctaw Indians; Miccosukee Indian Tribe of Florida; Mississippi Band of Choctaw Indians; Poarch Band of Creek Indians; Seminole Tribe of Florida; and Tunica-Biloxi Indian Tribe of Louisiana. The Seminole Tribe of Florida was the only Tribal Nation to respond, requesting the ability to review any remote-sensing survey reports that are conducted over the high-probability zones within the project area and to be notified if cultural resources that are potentially ancestral or historically relevant to the Seminole Tribe of Florida are inadvertently discovered at any point during this process. Neither the Seminole Tribe of Florida nor any other Tribal Nation requested further consultation.

Nonfederally-recognized tribes were welcomed to provide comments on the Draft Supplemental EIS during the public comment period. Announcements for the public meetings held in each of the Gulf Coast States further indicated that these meetings would provide the opportunity for any affected members of the public, including State-recognized tribes, to engage specifically in the Section 106 consultation process. No State-recognized tribes voiced concerns or requested additional consultation regarding either cultural or natural resources potentially impacted by the proposed alternatives.

Although none of the affected Tribal Nations have previously requested additional consultation regarding this Supplemental EIS, BOEM has taken the opportunity to begin the process of reinitiating programmatic Tribal consultation in light of our Agency's reorganization from BOEMRE to BOEM in October 2011 and the subsequently released Department of the Interior Policy on Consultation with Indian Tribes (December 2011). It warrants mentioning that this Supplemental EIS is a planning document only, and its finalization will not in and of itself impact any Tribal properties or areas otherwise utilized for cultural identity, livelihood, or subsistence. Should any such concerns be identified in the future, Tribal Nations will have the opportunity to reengage in consultations.

USEPA-45 Refer to the response to comment USEPA-44.

USEPA-46 Refer to the response to comment USEPA-44. In addition, **Chapters 4.1 and 4.2** of this Supplemental EIS and Chapters 4.1 and 4.2 of the 2012-2017 WPA/CPA Multisale EIS describe potential impacts to environmental resources as a result of routine and accidental activities, including oil spills. These environmental resources described include, but are not limited to, wetlands, commercial and recreational fishing, and fish resources and essential fish habitat. Though certain plants have historically been used by tribes for medicinal purposes or other traditional practices, consultations have not identified any indication that these resources are currently utilized by Tribal Nations or that they would be disproportionally affected, relative to other coastal vegetation, by the proposed activities.

USEPA-47 Refer to the response to comment USEPA-44.

USEPA-48 Comment noted. **Chapter 5** describes in detail the consultation and coordination procedures for the prelease planning process. For each proposed lease sale, notices are placed in the *Federal Register* requesting that interested parties provide comments on the proposed actions

as part of the scoping process. Environmental impact statements and environmental documents for proposed lease sales are also made available for public review and comment.

USEPA-49 Comment noted. BOEM believes that creating an additional analysis of comments by resource area is unnecessary, as relevant comments are incorporated directly into the individual resource analyses in **Chapter 4** as well as being addressed in **Chapter 5**. Because BOEM does not normally receive an exorbitant number of comments on prelease NEPA documents, comments received can be easily reviewed to ascertain comments for each resource in a reasonable amount of time. Nevertheless, BOEM takes your comment under advisement should, in the future, there be a need to change the formatting on responses to comments.

USEPA-50 Comment noted. Refer to the response to comment USEPA-48.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

December 21, 2012

To: Chief, Environmental Assessment Section
Leasing and Environment (MS 5410)
Bureau of Ocean Energy Management, Regulation and Enforcement
Gulf of Mexico Outer Continental Shelf (OCS) Region
New Orleans, Louisiana

From: Supervisor
Fish and Wildlife Service
Louisiana Ecological Services Office
Lafayette, Louisiana

Subject: Draft Supplemental Environmental Impact Statement for the Gulf of Mexico OCS Oil and Gas Lease Sales: 2013-2014; Western Planning Area Lease Sale 233; Central Planning Area Lease Sale 231

The Fish and Wildlife Service (Service) has reviewed the subject Draft Supplemental Environmental Impact Statement (SEIS) for the 2013-2014 Outer Continental Shelf (OCS) Oil and Gas Lease Sales in the Gulf of Mexico Western Planning Area and Central Planning Area for Lease Sales 233 and 231, administered by the Bureau of Ocean Energy Management, Gulf of Mexico OCS Region. Comments regarding the draft SEIS are provided below by the Louisiana Ecological Services Office in behalf of the Service's Southeast and Southwest Regions in accordance with provisions of the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

FWS-1

The Service has no significant comments regarding the draft SEIS. We look forward to reviewing and responding to your upcoming biological assessment of federally listed species per section 7 of the ESA. We anticipate impacts to all species listed in our letter dated April 6, 2012, will be assessed at that time.

Thank you for the opportunity to review the draft SEIS. Please contact Rob Smith (337-291-3134) of this office if you have any questions regarding our comments.

cc: NMFS, St. Petersburg, FL
FWS (RO), Atlanta, GA (attn.: Ken Graham and Christine Willis)
FWS (RO), Albuquerque, NM (attn.: Delfinia Montano)
FWS, Jackson, MS (attn.: Paul NeCaise)
FWS, Daphne, AL (attn.: Bill Pearson)
FWS, Panama City, FL (attn.: Channing St. Aubin)

FWS, Jacksonville, FL (attn.: Heath Rauschenberger)
FWS, Vero Beach, FL (attn.: Victoria Foster)
FWS, Clear Lake, TX (attn.: Edith Erfling)
FWS, Corpus Christi, TX (attn.: Dawn Whitehead)

FWS-1 Comment noted.

LANCE R. LEFLEUR
DIRECTOR

ROBERT J. BENTLEY
GOVERNOR

Alabama Department of Environmental Management
adem.alabama.gov
1400 Coliseum Blvd. 36110-2400 ■ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700 ■ FAX (334) 271-7950

December 12, 2012

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 OCS Oil & Gas Lease Sales
WPA 233 / CPA 231 Draft Supplemental Environmental Impact Statement
ADEM Tracking Code: 2013-045-BOEMRE

Dear Mr. Goeke:

The Alabama Department of Environmental Management (ADEM) reviewed BOEM's Draft Supplemental EIS for the Western Planning Area Lease Sale 233 and the Central Planning Area Lease Sale 231 for Outer Continental Shelf (OCS) activities in the Gulf of Mexico.

ADEM-1

Historically, the Governors of the State of Alabama have opposed the sale of leases within 15 miles of the Baldwin County, Alabama coastline. The ADEM supports the leasing of any unleased blocks in the Central Planning Area and Western Planning Area except those blocks within 15 miles of the Baldwin County, Alabama coastline. 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.

Call or write Allen Phelps anytime with questions. He may be reached by phone [251] 432-6533 or e-mail at: cap@adem.state.al.us.

Sincerely,

Steven O. Jenkins, Chief
Field Operations Division

SOJ/cap

c: Dr. Berry (Nick) H. Tew, Jr., Geological Survey of Alabama
Phillip Hinesley, ADCNR Coastal Section
Brian Cameron Jr., BOEM

Birmingham Branch
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (FAX)

Decatur Branch
2715 Sandlin Road, S. W.
Decatur, AL 35603-1333
(256) 353-1713
(256) 340-9359 (FAX)

Mobile Branch
2204 Perimeter Road
Mobile, AL 36615-1131
(251) 450-3400
(251) 479-2593 (FAX)

Mobile-Coastal
4171 Commanders Drive
Mobile, AL 36615-1421
(251) 432-6533
(251) 432-6598 (FAX)

ADEM-1 As noted in ADEM's letter, the Governors of Alabama have historically indicated opposition to new leasing south and within 15 mi (24 km) of Baldwin County; however, they have requested that, if the area is offered for lease, a lease stipulation to reduce the potential for visual impacts should be applied to all new leases in this area. Prior to issuance of the Final Notice of Sale for Sale 172 in 1999, this Agency's Gulf of Mexico OCS Regional Director, in consultation with the Geological Survey of Alabama/State Oil and Gas Board, developed a lease stipulation to be applied to any new leases within the 15-mi (24-km) area to mitigate potential visual impacts. 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 adopted in each of the CPA lease sales in the 2002-2007 and 2007-2012 Five-Year Programs, and it will be considered for adoption as part of the proposed CPA lease sales in the 2012-2017 Five Year Program, including proposed CPA Lease Sale 231, which is tentatively scheduled to be held in August 2013.

BOEM may apply a number of lease sale mitigations and stipulations to minimize the impacts of oil and gas exploration and development. **Chapter 2.2.2** of this Supplemental EIS and Chapter 2.2.2 of the 2012-2017 WPA/CPA Multisale EIS discuss these mitigations and stipulations, including the Topographic Features Stipulation. Additionally, a number of site-specific mitigations for environmental protection and safety are routinely applied by BOEM and BSEE at the post-lease stages. All exploration plans, development plans, and pipeline applications are thoroughly reviewed to determine what protective measures should be included as a condition of plan or permit approval. Mitigations and stipulations are developed as conditions warrant and are subject to a review and approval process.

DIVISION OF AQUACULTURE
(850) 488-5471

MAGNOLIA CENTER, SUITE 501
1203 GOVERNOR'S SQUARE BOULEVARD
TALLAHASSEE, FLORIDA 32301

FLORIDA DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES
COMMISSIONER ADAM H. PUTNAM

Please Respond to:

Division of Aquaculture
Shellfish Environmental Assessment Section
Western Gulf Coast District Office
4408 Delwood Lane
Panama City Beach, FL 32408
Phone: 850-236-2200

November 27, 2012

Gary D. Goeke, Chief
Regional Assessment Section
Office of Environment (GM 623E)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

RE: Comments on 2012-2017 proposed lease sales of Western Planning Area 229, 233, 238, 246 and 248, and Central Planning Area 227, 231, 235, 241, and 247.

Applicant: US Dept of the Interior, Bureau of Ocean Energy Management.

The Central Planning area in this Initial Plan of Exploration is located approximately 50 - 100 miles or more southwest of the nearest Florida shellfish harvesting area which is the Pensacola Bay shellfish harvesting area (#02), Escambia and Santa Rosa Counties. The following comments by the Division are based solely on shellfish classification and management for public health.

According to the document, 10 lease sales are planned in the central and western planning area for the potential of future oil and gas exploration. The impacts from the proposed offshore oil and gas exploration activities will include drilling fluids and cuttings, ballast water, and uncontaminated seawater. Minor discharges will include sanitary and domestic wastes. Hurricanes are considered the major cause of accidental oil spills.

Considering the volume of any potential effluent discharges and the distance between the project and the Florida coastline, these effluent discharges do not appear to have the potential to impact any of the shellfish harvesting areas located within the State of Florida. However, a greater concern is the potential impacts to shellfish resources that can result in the case of a major accidental release of a chemical, oil, or fuel spill. While such an event is unlikely due to safeguards established by the applicant, unexpected fluid releases can occur.

If the project is completed as proposed, it will not result in the reclassification or closure of shellfish harvesting areas in Florida. Adverse impacts are not expected because the proposed project is located a sufficient distance away from shellfish resources.

FDACS-1

As a safety measure, please include the Division of Aquaculture in the oil spill response plan contact list to be notified if significant oil, chemical, or fuel spill occurs. Upon such notice, we would invoke our emergency procedures to close shellfish areas to harvesting if necessary.

Thank you for the opportunity to comment. Please call if you need additional information.

Sincerely,

Loanna Torrance

Environmental Specialist II

Attachment:

http://www.arcgis.com/explorer/?open=0275bf48adde40d88df75e5ef0a17197

cc: Chris Brooks

Escambia County file

FDACS-1 Comment noted. The commenter's contact information was forwarded to BSEE to be included in the oil-spill response contact list.

BOBBY JINDAL
GOVERNOR

STEPHEN CHUSTZ
INTERIM SECRETARY

State of Louisiana

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF COASTAL MANAGEMENT

December 11, 2012

Mr. Gary D. Goeke, Chief
Regional 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

RE: Draft Supplemental Environmental Impact Statement (SEIS) for Western Planning Area Lease Sale 233 and Central Planning Area Lease Sale 231

Dear Mr. Goeke:

The Department of Natural Resources (DNR) has received the draft SEIS, which updates the analyses performed for Gulf of Mexico Outer Continental Shelf (OCS) Oil and Gas Lease Sales: 2012 – 2017 to address the above-referenced lease sales. Previously, we reviewed and commented on the Notice of Intent to prepare the draft SEIS by letter to you dated August 8, 2012. At that time, we advised that the Multisale EIS did not fully address our concerns regarding cumulative, secondary and indirect impacts associated with OCS lease sales, nor did it adequately address appropriate and adequate compensatory mitigation for these impacts. Please find our comments on the draft SEIS below.

As we have stated in prior correspondence to BOEM, the State of Louisiana strongly supports offshore oil and gas lease sales in the Gulf of Mexico. For more than 50 years, Louisiana has ably and reliably played a large part in providing crude oil and natural gas from the deep waters off its shore. We want energy production in the federal waters of the OCS to grow and be a driver for jobs, businesses and economic recovery, while fueling the nation's energy needs.

LADNR-1

While Louisiana strongly favors OCS leasing, offshore energy development has impacted the coastal wetlands of our State. Our coastal zone has gone from one of net land building to net land loss due, in no small part, to preventable, anthropogenic causes. As the administrative agency responsible for OCS waters, and supervision of most offshore operations after lease issuance, we believe that the Bureau of Ocean Energy Management (BOEM) should take a more proactive approach to help conserve Louisiana's nationally significant coastal wetlands by adequately assessing the environmental impacts associated with this and other lease sales.

Post Office Box 44487 • Baton Rouge, Louisiana 70804-4487
617 North Third Street • 10th Floor • Suite 1078 • Baton Rouge, Louisiana 70802
(225) 342-7591 • Fax (225) 342-9439 • http://www.dnr.louisiana.gov
An Equal Opportunity Employer

Louisiana's future ability to support offshore exploration and development depends on the conservation of its coastal resources and its coastal resiliency. As positive results are within our grasp, the various nuances of exploration and development and their impacts on coastal land loss and erosion, along with strategies for prevention and reversal, should be the top priority and focus of these environmental assessments.

LADNR-2

DNR believes a better appraisal of coastal effects is necessary in the preparation of National Environmental Policy Act (NEPA) documentation for OCS lease sales. At this level, the full measure of coastal effects may be addressed, potential impacts quantified and mitigation plans developed. The State of Louisiana continues to maintain that an aggregate approach to mitigation is necessary to account for direct, indirect and cumulative impacts from all prior and future lease sales, and that BOEM is the responsible agency to undertake this accounting. While effects from Lease Sales 233 and 231 may be a small percentage of total OCS activity, consideration must be given to historic activity before determining the incremental contribution of OCS impacts to wetland loss.

DNR is pleased that BOEM has better substantiated its modeling methods for this draft SEIS document, improving upon the existing Multisale EIS 2012 – 2017, and urges BOEM to continue to more thoroughly evaluate and provide documentation of its procedures and methods by which impact assessments are derived. This is imperative if fair and objective impact evaluations are to be conducted regarding all OCS lease sale activities. DNR is confident that BOEM will more effectively revisit many of the specific predictions made for earlier lease sales, and collect data to determine whether the models and predictive techniques used were accurate.

LADNR-3

As petroleum exploration and development have had an impact on Louisiana's coastal area, a proportionate share of royalties from these activities should be directed to the State to provide the means for restoration and conservation efforts, much of which is also to the benefit of the energy community. BOEM could more thoroughly initiate partnerships with State and Federal agencies to fund such undertakings. A system of revenue sharing with the Gulf of Mexico states benefits all and might influence some who presently oppose offshore exploration to reconsider their positions.

Our coastal communities and the very land upon which they stand continue to be imperiled by the failure to adequately compensate for impacts to coastal habitat and critical infrastructure. Louisiana is a willing host state to OCS exploration and production, incurring the consequences of those activities and thus should be adequately compensated for those impacts. Louisiana should be allowed its full potential to provide energy, jobs and economic strength.

Mr. Gary D. Goeke
December 11, 2012
Page 3

The State of Louisiana appreciates the coordination with BOEM and looks forward to Lease Sale planning that ensures conservation of our imperiled coastal wetland resources by thoroughly addressing all aspects of OCS development.

Sincerely,

Keith Lovell
Acting Administrator

KOL:pso

cc: Tershara Matthews, BOEM MS 5412
Brian Cameron, BOEM MS 5412
Project file C20120356

LADNR-1 Chapters 4.1.1.4 and 4.2.1.4 of this Supplemental EIS and Chapters 4.1.1.4 and 4.2.1.4 of the 2012-2017 WPA/CPA Multisale EIS describe the environmental impacts of proposed lease sales on coastal wetland resources. Cumulative analyses are also included in order to put the incremental contribution of these proposed WPA and CPA lease sales in context considering all of the other types of activities (past, present, and reasonably foreseeable) that have the potential to cause impacts, including impacts from other lease sales that are part of the overall OCS Program.

LADNR-2 Refer to the response to comment LADNR-1. 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, the incremental contribution of an individual lease sale to these impacts is very small. 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 activities. BOEM includes a robust consideration of potential mitigation in its analysis. Please note, however, that BOEM's authority to require certain types of mitigation is limited and that the Agency has no or limited authority to provide or mandate compensatory mitigation for activities regulated by other Federal and State agencies, such as the Louisiana Coastal Use permit program.

LADNR-3 Comment noted. The distribution of royalties is outside the scope of these proposed actions and NEPA analyses. Nevertheless, BOEM acknowledges that in recent years Louisiana has received over $1 billion in OCSLA 8(g) revenues, over half a billion dollars in Coastal Impact Assistance Program funds, and stands to receive additional offshore revenue shares in the coming years as provided for in the Gulf of Mexico Energy Security Act of 2006.

December 24, 2012

Mr. Gary D. Goeke
Chief, Environmental Assessment Section
Leasing and Environment (MS 5410)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Via E-mail to LS__233-231SEIS@boem.gov

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 for the Gulf of Mexico (GOM) Outer Continental Shelf (OCS) Oil and Gas Lease Sales: 2013-2014 for the Western Planning Area (WPA) Lease Sale 233 and the Central Planning Area (CPA) Lease Sale 231 (also referred to as the DSEIS). On November 9, 2012, BOEM published the *Notice of Availability* in the *Federal Register* announcing publication of the DSEIS and requesting comments on or before December 24, 2012. The API is a national trade association that represents over 500 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. API provided comments on the earlier NEPA documents associated with the Multisale EIS for proposed WPA and CPA 2012-2017 GOM lease sales and is pleased to provide these additional comments on the DSEIS for Lease Sales 231 and 233.

BOEM's DSEIS addresses two proposed Federal actions that offer for lease areas on the GOM OCS that have historically contained substantial reserves of economically recoverable oil and gas resources. The WPA and CPA of the Gulf of Mexico constitute one of the world's major oil and gas producing areas, and have proved a steady and reliable source of U.S. crude oil and natural gas for more than 50 years. Under the proposed *Outer Continental Shelf Oil and Gas Leasing Program: 2012-2017* (5-Year Program), five annual area-wide lease sales are scheduled for the Western Planning Area (WPA) and five annual area-wide lease sales are scheduled for the Central Planning Area (CPA). The proposed WPA lease sales are Lease Sale 229 in 2012, Lease Sale 233 in 2013, Lease Sale 238 in 2014, Lease Sale 246 in 2015, and Lease Sale 248 in 2016. The proposed CPA lease sales are Lease Sale 227 in 2013, Lease Sale 231 in 2014, Lease Sale 235 in 2015, Lease Sale 241 in 2016, and Lease Sale 247 in 2017.

The two planning areas are critically important hydrocarbon energy producing areas where existing infrastructure and expertise can be used to increase our nation's oil and natural gas resources. And, they are the only OCS areas where industry is offered opportunities to explore for oil and natural gas resources on a regular basis. Predictable lease sales in these Planning Areas 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 and investment required for offshore development and avoids the potential of having years wasted in bringing production to the market.

BOEM's NEPA Analysis

API supports the analysis made by BOEM in the GOM OCS Oil and Gas Lease Sales: 2013-2014 Draft Supplemental Environmental Impact Statement (OCS EIS/EA BOEM 2012-105); however, we offer some recommendations below to improve the draft. 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 2 proposed lease sales in the Western and Central Planning Areas, without delay. API notes that the DSEIS incorporates, by reference to the GOM OCS Oil and Gas Lease Sales: 2012-2017, WPA Lease Sales 229, 233, 238, 246 and 248; CPA Lease Sales 227, 231, 235, 241, 235, 241, and 247, Final EIS (Multisale EIS) updated information and analyses regarding the 2010 Deepwater Horizon (DWH) incident. This new information supports the NEPA process by describing the current environmental baseline conditions in the CPA and WPA including the results of numerous new scientific studies regarding the incident. 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 within the DSEIS updated the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the WPA and CPA since publication of the Multisale EIS. By reference, the DSEIS includes the detailed Catastrophic Spill Event Analysis provided in Appendix B of the Multisale EIS. 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)

Because each lease sale proposal and projected activities are very similar each year for each sale area, BOEM prepared a single EIS for the 10 WPA and CPA lease sales (Multisale EIS). 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 is aware that at the completion of this DSEIS process, agency decisions will be made only for proposed Lease Sale 233 in the WPA and proposed Lease Sale 231 in the CPA. We understand that a NEPA review will be conducted before each subsequent lease sale following lease sales 233 and 231. 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 DSEIS

API-1

The DSEIS considers three alternatives each, for both the proposed WPA lease sale 233, and for proposed CPA lease sale 231. API strongly supports Alternatives A (the *Proposed Action*) for both of the proposed WPA and CPA lease sales areas:

WPA lease sale 233

Alternative A (Preferred Alternative)—The Proposed Action: This alternative would offer for lease all unleased blocks within the WPA lease sale area for oil and gas operations, except the following:

(1) Whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary.

CPA lease sale 231

Alternative A (Preferred Alternative)—The Proposed Action: This alternative would offer for lease all unleased blocks within the CPA for oil and gas operations, with the following exceptions:

(1) Whole and portions of blocks deferred by the GOM Energy Security Act of 2006; and
(2) Blocks that are beyond the U.S. Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap.

API-2

API is opposed to Alternatives B and C identified for the two lease sale areas because the DSEIS analysis does not provide any basis to conclude that there are significant adverse impacts of offering these areas with the proposed mitigation. For the WPA Lease Sale 233, Alternative B is described as *The Proposed Action Excluding the Unleased Blocks Near Biologically Sensitive Topographic Features*. For the CPA Lease Sale 231, Alternative B is described as *The Proposed Action Excluding the Blocks Near Biologically Sensitive Topographic Features*. In essence, Alternatives B are the *Proposed Action* (Alternative A) for the WPA and CPA lease sale areas except that blocks near biologically sensitive topographic features (subject to the Topographic Features Stipulation) would be excluded from leasing. Alternative C, for both lease sale areas, is described as the *No Action* alternative. For the WPA, Alternative C is described as "the cancellation of WPA lease sale 233." For CPA lease sales, Alternative C is described as "the cancellation of the lease sale 231." API strongly urges BOEM to adopt Alternative A for both the WPA Lease Sale 233 and CPA Lease Sale 231.

Suggestions for Finalizing the SEIS

While API believes that BOEM's DSEIS is well written and supported by references to applicable scientific studies, as with any such endeavor, the document could be made even stronger. API recognizes the need for a "cut-off point" for new information so that the administrative process for finalizing the DSEIS can proceed. To this end, API submits the attached enclosure to this letter that provides recommendations for strengthening the DSEIS. The enclosure, *API Comments on the GOM OCS Oil and Gas Lease Sales: 2013-2014, WPA Lease Sale 233, CPA Lease Sale 231 DSEIS*, is a table that presents API comments that generally

reference a specific section or page within the DSEIS or, in some cases, address more general issues. API offers this enclosure for the Agency's consideration in developing the final SEIS for the WPA and CPA lease sales proposed in the GOM between 2013 and 2014.

In addition to the comments included in the enclosures, API offers the following additional suggestions for consideration by BOEM.

1. **Discussion of "Incomplete and Unavailable" Information**

API - 3

For several subjects, the DSEIS 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 [See previous API comments on this topic (June 6, 2011 Lease Sale 218 DSEIS comments – transmittal letter)].

The oil and natural gas industry stands ready to invest in safe exploration and development of the GOM. The resources of the GOM remain a vital source of jobs, revenue, energy and economic growth. We believe that these resources can be safely developed, and we ask that the department finalize the 2013-2014 WPA Lease Sale 233, CPA Lease Sale 231 DSEIS as quickly as possible so that leasing can continue in accordance with Alternative A as proposed in the DSEIS.

Sincerely,

Andy Radford

Enclosure: *API Comment Matrix on the GOM OCS Oil and Gas Lease Sales: 2013-2014, WPA Lease Sale 233, CPA Lease Sale 231 DSEIS*

API-1 Comment noted. If the ASLM's decision is to hold a proposed lease sale under Alternative A, it will be announced in the Final Notice of Sale.

API-2 Comments noted. If the ASLM's decision is to hold a proposed lease sale under Alternatives A or B, it will be announced in the Final Notice of Sale. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the *Federal Register*.

API-3 API's statement that the currently unavailable information is not essential to a reasoned choice among alternatives is not accurate. There are several resources in which the incomplete or unavailable information is relevant to reasonably foreseeable significant adverse impacts and may be essential to a reasoned choice among alternatives. The introductions to **Chapters 4.1 and 4.2** contain detailed discussions of incomplete or unavailable information and list those specific resources in which the incomplete and unavailable information may be essential to a reasoned choice among alternatives.

API Comments on the 2013-2014 GOM OCS Lease Sale WPA 233 & CPA 231

API ENCLOSURE 1 (API 1) COMMENTS 1-8

No..	DSEIS Section No.	Page No.	COMMENT
1	General	NA	The amount of information and level of detail presented in this DSEIS should allow for significant tiering / incorporation by reference of material in future NEPA reviews.
2	General	NA	Cumulative Impact: A more consistent approach to describing information on cumulative impacts to various subjects is needed throughout the DSEIS. Although for some subjects discussions appear adequate and comprehensive, for others this analysis could be improved to fully convey the findings provided in the Multisale EIS.
3	General	NA	API supports BOEM's conclusion that marine sound is unlikely to be significant and notes that this finding is consistent with several prior agency NEPA documents. "Within the WPA, 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. Therefore, in light of the above analysis for a WPA proposed action and its impacts, the incremental effect of a WPA proposed action on marine mammal populations is not expected to be significant when compared with non-OCS energy-related activities." [per 4-215; Final Environmental Impact Statement for 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]
4	General	NA	During any discussions on water quality, or potential impacts from DWH event, BOEM presently provides generic information on 'elevated' PAH concentrations. If there is a mechanism to discount the levels of PAHs that have been observed rather than just stating a relative amount, we recommend the former approach. For instance, if concentrations are available, the document should state that they do or do not exceed federal water quality criteria or any other water quality standard available. This would provide a context for the discussion on PAHs and allow for at least some measure of their potential risk to both WQ and biotic receptors.
5	Summary	xiv	API supports BOEM's judgment that: Routine activities in the WPA and CPA, such as seismic surveys and pipeline trenching, would cause negligible impact and would not deleteriously affect commercial fishing activities.
6	1.5	1-13	Paragraph 2 – insert '*the*' between "the US Air Force, and ___ USCG." The corrected sentence should read: "the US Air Force, and *the* USCG".
7	1.5	1-19	Paragraph 3 – insert the words "are also" after (b) (b)) on line 13.
8	2.1	2-3	The Draft Supplemental EIS (DSEIS) is noted as the final NEPA review conducted for the proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231. Although this may be technically correct for the lease sale opportunity (as noted in Section 2.2.2.1 (pg. 2-6)), exploration and development plans, as well as pipeline applications that result from lease sales, will undergo a NEPA review. It is suggested that the language in Sect. 2.1 be modified to reflect the entire process that requires NEPA analysis. As

API Comments on the 2013-2014 GOM OCS Lease Sale WPA 233 & CPA 231

API 1 COMMENTS 9-17

			the NEPA process is directed towards public involvement, the acknowledgement of further opportunities for public input is warranted.
9	2.2.1	2-3	The following sentence is confusing and needs to be rewritten: *BOEM has not identified any new significant information that changes its conclusions in the 2012-2017 WPA/CPA Multisale EIS that these suggestions are not appropriate for further in-depth analysis.*
10	2.2.1.2	2-4	Table 2-1. The table provides information on Alternatives for EPA **225 & 226** that is not addressed by the DSEIS for lease sales in the CPA and WPA.
11	2.2.2.2	2-7	For public information, it would be helpful to provide a link or information on accessibility of the 120 standard BOEM mitigation measures that are being prescribed throughout the NEPA process to reduce impacts to various resources.
12	2.2.2.2	2-7	Paragraph 2 – for ease of understanding, it might make more sense to construct two tables that list all of the site-specific mitigation categories and all of the site-specific mitigation types instead of listing them all out in paragraph form.
13	2.3.2.1	2-11	The Topographic Features Stipulation is currently in affect and is routinely applied to GOM lease sales. Since this is the case, suggest removing the word *proposed* from the first sentence in section 2.3.2.1.
14	3.1.1.1	3-4	It seems that the order of the two sections under this heading could be switched, such that OCS Program general information is first, followed by the Proposed Action information.
15	3.1.1.2	3-5	Review of the SEIS indicates that, in general, there is little additional information since preparation of the Multi-Sale EIS regarding the marine sound issue. a. Chapter 3.1.1.2.1 of the 2012-2017 WPA/CPA Multi-Sale EIS describes in detail seismic survey operations including ocean-bottom surveys. b. BOEM has re-examined the analysis for marine mammals presented in the 2012-2017 WPA/CPA Multi-Sale EIS, based on the additional information provided above. No new significant information was discovered that would alter the impact conclusion for marine mammals presented in the 2012-2017 WPA/CPA Multisale EIS, although information remains incomplete or unavailable. The analysis and potential impacts detailed in the 2012-2017 WPA/CPA Multi-Sale EIS still apply for proposed CPA Lease Sale 231. [see 4-122] API supports BOEM's conclusion that: Marine sound associated with seismic and other industry activities has not caused injury or a biologically significant population level effects for marine mammals, fish or turtles; Current mitigation measures are adequate, protective and further reduce any potential adverse marine sound effects.
16	3.1.1.2.1	3-6	API supports BOEM's judgment that: Seismic surveys activity levels are moderate and that they may decline in the future.
17	3.2.2	3-17	Please verify that BOEM is the correct agency for reporting regarding 'loss of well control.' We

API Comments on the 2013-2014 GOM OCS Lease Sale WPA 233 & CPA 231

API 1 COMMENTS 18-28

			understand that BSEE is the lead agency for drilling safety and loss of well control issues.
18	3.3.4	3-97	Paragraph 1: This section needs to include climate change issues relative to coastal water quality. Although Sea-level Rise (Section 3.3.4.1) addresses one element of climate change, it does not deal with changing surface water temperatures and the effects of this phenomenon.
19	4.1	4-3	API wonders why BOEM has prepared a section on Alternatives when there is an entire section (Section 2) on these issues. This seems redundant, especially considering that the heading for Section 4 is *Description of the Environment and Impact Analysis*.
20	4.1	4-5	4th Paragraph – the term *Macondo spill* is used to represent the DWH event, but seems this is the only place it is used. It is suggested that BOEM be consistent and use only the term **DWH event** throughout the DSEIS.
21	4.1.1.1	4-9	3rd Paragraph – The locations noted for the OCD modeling effort are provided here as distances from shore, but in **Appendix A** they are noted by their specific lease blocks (CPA [MC856] and WPA [EB446]; see page A-6, *Limitations*. Recommend using consistent terms/descriptions used for these locations – it is suggested that BOEM use both types of information in all sections that address modeling locations.
22	Sec. 4.1.1.2	4-12	It would be beneficial to provide more detail concerning PAH's and their potential effects to marine life at this particular scale of release.
23	4.1.1.4	4-19	Last Paragraph – suspected typo: *The WPA proposed action represents a small (>5%) portion…* We suspect this should have been **(<5%)**.
24	4.1.1.4	4-20	Typo: *Wetlands in the WPA was likely…* Should be *were*.
25	4.1.1.5	4-21	4th Paragraph – the word '*quick*' does not apply to spill duration. Suggest BOEM reword this to use term(s) such as *short term*, *limited*, etc.
26	4.1.1.7	4-25	Large sections of text on this page provide redundant information. See Paragraphs 3 and 5 – "*Sargassum, as a pelagic algae, is a widely…*"
27	4.1.1.11	4-36/37	API supports BOEM's judgment that: Present mitigation measures are adequate and reduce potential adverse effects. "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 shutdowns for whales in the exclusion zone, ramp-up procedures, and the use of a minimum sound source. Therefore, no significant cumulative impacts to marine mammals 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."
28	4.1.1.12	4-39	Regarding information from sea turtle necropsies, it would be fitting for BOEM to state emphatically that no sea turtles died from oil exposure, if that is the case, or state that no information is presently available regarding acute toxicity to sea turtles from the DWH event, or other oil spills.

API Comments on the 2013-2014 GOM OCS Lease Sale WPA 233 & CPA 231

API 1 COMMENTS 29-39

29	4.1.1.16	4-52	API supports BOEM's judgment that: The effect of seismic surveys on fisheries have been determined to be limited in time and space. The effects are, therefore, expected to be minimal overall.
30	4.1.1.16	4-54	This section references freshwater diversions that took place in conjunction with the DWH event and Mississippi River flooding. The DSEIS should clarify that the freshwater diversions in 2010 were unilaterally implemented by the State of Louisiana and were not a response action authorized by the Unified Area Command. Moreover, the DSEIS should clarify that the 2011 freshwater diversions were unrelated to the DWH event.
31	4.2	4-80	2nd Paragraph – Remove one of the '*relevant*'s in sentence "*BOEM reviewed relevant… and, where relevant, …*" Also, insert the word 'spill' between *catastrophic* and *events*, near middle of paragraph.
32	4.2	4-81	See Comment No. 21.
33	4.2.1.1	4-83	See Comment No. 22.
34	4.2.1.3	4-92	4th Paragraph – Recommend noting some of the '*modern techniques*' now being employed, such as sub-bottom boring (HDD), that cause little or no impact to barrier islands and beaches. For example, see 4.2.1.4, Wetlands, Page 4-94 [5th paragraph] for language that would be similar to what is needed.
35	4.2.1.3	4-93	The DSEIS makes certain statements with response to sporadic tarballs and other isolated oiling uncovered after Hurricane Isaac, and states "*These observations suggest that oil and tar from the DWH event remain in the nearshore Gulf where they can be resuspended and deposited on barrier beaches by storms.*" To the extent that the DSEIS discusses remnant oil from the DWH event in relation to Hurricane Isaac, it should be noted that BP and government Shoreline Cleanup Assessment Technique (SCAT) teams conducted hundreds of post-Isaac shoreline surveys based on a plan developed jointly between BP, the Federal On-Scene Coordinator, and the States. Those surveys documented limited, localized residual oil in areas where possible limited residual oiling was anticipated. In addition, such discussions should also note OSAT II's finding that potential cancer and non-cancer health effects from short and long-term exposures to DWH oil are below U.S. Environmental Protection Agency (USEPA) acceptable health-based risk and hazard levels.
36	4.2.1.4	4-96	Define "*channel armor*", and provide how under the current program this 'may' be added at a later date. If there is a current BOEM program that can/will evaluate this phenomenon and subsequently direct this action, recommend explaining this.
37	4.2.1.8	4-109	See Comment No. 27.
38	4.2.1.12	4-120	API supports BOEM's judgment that: Marine sound will not have a significant impact on marine mammal (MM) populations, and that: Some routine activities related to the CPA proposed action have the potential to have adverse, but not significant impacts to MM populations in the GOM. With most other routine activities expected to have negligible effects.
39	4.2.1.12	4-120	API supports BOEM's judgment that: "Impacts from vessel traffic, structure removals, and seismic activity could negatively impact marine mammals; however, when mitigated as required by BOEM and

API Comments on the 2013-2014 GOM OCS Lease Sale WPA 233 & CPA 231

API 1 COMMENTS 40-46

			NMFS, these activities are not expected to have long-term impacts on the size and productivity of any marine mammal species or population."
40	4.2.1.13	4-124	API supports BOEM's judgment that: "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, and the use of a minimum sound source. Therefore, 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."
41	4.2.1.13	4-124	API supports BOEM's judgment that: The best available scientific information indicates that sea turtles do not rely on acoustics; therefore, vessel noise and related activities would have limited effect. Consequently, no significant cumulative impacts would be expected from the CPA proposed action's activities or as the result of past, present, or reasonably foreseeable oil and gas leasing, exploration, development, and production in the Gulf of Mexico.
42	4.2.1.19	4-143	API supports BOEM's judgment that: Routine activities such as seismic surveys and pipeline trenching in the CPA would cause negligible impacts and would not deleteriously affect commercial fishing activities. Because seismic surveys are temporary events, they are not expected to cause significant impacts to commercial fisheries.
43	4.2.1.20	4-148	The DSEIS makes various statements with respect to the availability of data from the DWH event in relation to recreational fishing. NOAA's Marine Recreational Information Program data, which shows limited impact of the DWH event on recreational fishing, should be considered in this discussion.
44	4.2.1.21	4-149	The word "*enough*" should be inserted after the words "*significantly large*" on the 18th line from the bottom of the page.
45	4.3	4-170	API supports BOEM's judgment that: All OCS activities involve temporary and exclusive use of relatively small areas of the OCS over the lifetimes of specific projects.
46	Table 2.1	Tables-3	BOEM has established an alternative and mitigation tracking table (see Table 2-1 on page 306 of the PDF) to provide increased visibility into the consideration of recommendations for deferrals, mitigations, and alternatives at different stages of the leasing process. While this is a good concept, particularly to track changes in mitigation strategies, the table at this stage is inadequate and only summarizes suggested alternatives that were received during scoping or other comments from the multi-sale EIS. For example, one of the proposed alternatives is, "Do Not Allow Drilling in Areas with Strong Ocean Currents Such as the Loop Current." The table references sub-chapters of the SEIS for more information, but those sub-chapters then direct readers to the analysis provided in the multi-sale EIS. If the readers do not make it all the way back to the multi-sale EIS, then they are presented with BOEM's decision on the alternative in

API Comments on the 2013-2014 GOM OCS Lease Sale WPA 233 & CPA 231

API 1 COMMENTS 46-47

			the table, which says the alternative was "considered but not analyzed in detail." This is not a true representation of BOEM's decision-making process; these alternatives were considered in detail in the multi-sale EIS. The decision summary listed in the table should be changed to say, "This alternative has been appropriately analyzed in detail in the multi-sale EIS and the risks are being adequately managed through rigorous regulatory requirements and best available technologies."
47	Table 4-2	Tables-12	Footnote 4 – The footnote states *"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%)."* The DSEIS should state whether this statement has been subject to peer review, and whether it is supported by any published literature being conducted as part of the NRDA which are evaluating the issue of how the number of birds collected relates to the estimated number of birds impacted by the DWH event. The results of these studies are not yet available; consequently, it is premature for the DSEIS to state what those studies will 'likely' show.

API 1-1 Comment noted.

API 1-2 The cumulative impact analyses in this Supplemental EIS are summaries of the cumulative impact analyses carried over from the 2012-2017 WPA/CPA Multisale EIS and includes relevant new information since the publication of the 2012-2017 WPA/CPA Multisale EIS. The cumulative impact analysis for each resource in this Supplemental EIS provides not only a summary of the cumulative impact analysis from the 2012-2017 WPA/CPA Multisale EIS but also references the chapter of the cumulative analysis in the 2012-2017 WPA/CPA Multisale EIS. For detailed descriptions of the cumulative impact analyses, reference the appropriate chapters in the 2012-2017 WPA/CPA Multisale EIS.

API 1-3 Comment noted.

API 1-4 BOEM does not intend to merely discount PAH's but rather to evaluate the affected environment for our proposed action, including the waters and sediments of the Gulf of Mexico. Unfortunately, evaluating every PAH concentration independently over time in the waters and sediments of the Gulf of Mexico to all biota is beyond the scope of this Supplemental EIS. The effects of PAH's are additive across all of the PAH compounds in petroleum, and USEPA does not list a value for total PAH's in its National Recommended Water Quality Criteria listings in the Aquatic Life Criteria table or in the Human Health Criteria table, although some individual PAH's are listed in the Human Health Criteria table for the consumption of water and organisms. The USEPA and NOAA have benchmarks values or screening quick reference tables (Squirts) for some potential contaminants; however, these are meant for initial screening purposes only. For PAH's, USEPA recommends more detailed benchmark calculations, not a simple number, due to the additive nature of PAH's. Some Squirts values are reported for total PAH's in marine sediments only.

For further information, please refer to the references below:

Buchman, M.F. 2008. NOAA: Screening quick reference tables. NOAA OR&R Report 08-1. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, Office of Response and Restoration Division, Seattle, WA. 34pp.

U.S. Environmental Protection Agency. 2011. Water quality benchmarks for aquatic life. Internet website: http://www.epa.gov/bpspill/water-benchmarks.html.

U.S. Environmental Protection Agency. 2011. Sediment benchmarks for aquatic life. Internet website: http://www.epa.gov/bpspill/sediment-benchmarks.html.

U.S. Environmental Protection Agency. 2012. National recommended water quality criteria. Internet website: http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm.

API 1-5 Comment noted.

API 1-6 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-7 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-8 Comment noted. Chapter 1.5 of the 2012-2017 WPA/CPA Multisale EIS describes post-lease activities, including exploration and development plans, and pipeline applications that result from lease sales. The NEPA review requirements and procedures for each category of post-lease activity are also described in Chapter 1.5 of the 2012-2017 WPA/CPA Multisale EIS. Information requests are issued as necessary to solicit public involvement in the preparation of post-lease NEPA documents.

API 1-9 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-10 **Table 2-1** was deleted from this Final Supplemental EIS. The alternative and mitigation tracking table has been placed on BOEM's website at http://www.boem.gov/5-year/2012-2017/Tracking-Table/.

API 1-11 BOEM is currently evaluating options for making the more common environmental mitigations available in a single combined format on BOEM's website. In the meantime, the mitigations that have been applied to site-specific environmental assessments and the associated approval letters for plans and permit applications are available at http://www.data.boem.gov/homepg/data_center/plans/plans/master.asp.

API 1-12 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-13 As described in **Chapter 2.2.2.1**, mitigation 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 lease sales 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. If the Topographic Features Stipulation is applied to WPA Lease Sale 233 or CPA Lease Sale 231 by the ASLM, it will be announced in the Final Notice of Sale. In recognition of the ASLM's authority to apply specific mitigations, the term "proposed" has been retained in the final text of this Supplemental EIS as it relates to the Topographic Features Stipulation.

API 1-14 **Chapter 3.1.1.1.1** provides production estimates for typical WPA and CPA lease sales. **Chapter 3.1.1.1.2** provides cumulative production estimates for the OCS Program, which represents production from lands currently under lease plus anticipated production from future lease sales over the 40-year analysis period. BOEM believes that the order of the two sections under **Chapter 3.1.1.1** remains appropriate and that no revisions are necessary.

API 1-15 Comment noted.

API 1-16 Comment noted.

API 1-17 Comment noted. The text of the Final Supplemental EIS has been revised to state that all losses of well control must be reported to BSEE.

API 1-18 Climate change is a global phenomenon influenced by many activities worldwide. BOEM's general policy is to address programmatic issues such as global climate change at the Five-Year Program level rather than at the individual lease sale level. Thus, the effects of climate change are thoroughly considered and discussed in the Five-Year Program EIS (USDOI, BOEM, 2012c). Chapter 3.3 of the Five-Year Program EIS addresses consideration of climate change and the baseline environment, while Chapter 3.4.1.3 of the Five-Year Program EIS discusses specific climate change effects on water quality in the Gulf of Mexico. Refer to **Chapters 4.1.1.1 and 4.2.1.1** of this Supplemental EIS.

API 1-19 **Chapter 2** describes the environmental and socioeconomic effects of the proposed lease sales and alternatives, and it also discusses the potential mitigating measures to avoid or minimize impacts. **Chapter 4** describes the affected environment and provides an analysis of the routine, accidental, and cumulative impacts of the proposed actions and the alternatives on environmental and socioeconomic resources of the Gulf of Mexico. As these chapters serve different purposes and offer different analyses, BOEM feels a reorganization of the Supplemental EIS is not required, even if there are some redundancies.

API 1-20 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-21 Comment noted. The text was changed in **Chapters 4.1.1.1 and 4.2.1.1** to address the comment.

API 1-22 Comment noted. Chapters 4.1 and 4.2 of the 2012-2017 WPA/CPA Multisale EIS, which are incorporated by reference in this Supplemental EIS, contain information describing the effects of PAH's and their potential effects on various marine resources, where applicable.

API 1-23 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-24 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-25 Comment noted. The text was changed in **Chapter 4.1.1.5** from "quick" to "short term."

API 1-26 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-27 Comment noted.

API 1-28 Comment noted. The stranded turtle investigations are conducted by NMFS and are ongoing. As described in **Chapter 4.1.1.12**, relevant data on the status of sea turtle populations after the *Deepwater Horizon* explosion, oil spill, and cleanup and on the increased sea turtle strandings may take years to acquire and analyze, and impacts from the *Deepwater Horizon* explosion, oil spill, and cleanup may be difficult or impossible to discern from other factors. As such, BOEM's subject0matter experts believe that the statements remain accurate as written.

API 1-29 Comment noted.

API 1-30 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-31 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-32 Comment noted. The text was changed in **Chapter 4.2.1.1** to address the comment.

API 1-33 Refer to the response to comment API 1-22.

API 1-34 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-35 The comment from API includes some factual observations that are accurate. However, they do not contradict what has been written in the Draft Supplemental EIS, which is also accurate and which BOEM's subject-matter experts believe are the most pertinent to informing the decisionmaker. With regard to the comment on health risks, please note that this section discusses impacts to coastal barrier beaches and dunes but not impacts to humans. Health impacts to humans are discussed in the environmental justice analysis (**Chapter 4.2.1.23.4** of this Supplemental EIS), which tiers from the more extensive analysis of short- and long-term exposures to the *Deepwater Horizon* oil spill in Chapter 4.2.1.23.4.3 of the 2012-2017 WPA/CPA Multisale EIS.

API 1-36 Channel armor is shoreline protection such as rip rap, rocks, or other breakwaters designed to reduce shoreline erosion in a channel. Any such armor added to existing pipeline channels would be done through a State's Coastal Management Program, the U.S. Army Corps of Engineers, or the U.S. Dept. of Transportation; it would not originate with BOEM. Refer to **Chapter 4.2.1.4** of this Supplemental EIS and to Chapter 3.1.1.8 of the 2012-2017 WPA/CPA Multisale EIS.

API 1-37 Comment noted.

API 1-38 Comment noted.

API 1-39 Comment noted.

API 1-40 Comment noted.

API 1-41 Comment noted.

API 1-42 Comment noted.

API 1-43 The NOAA's Marine Recreational Information Program data consist of effort data, catch data, and data regarding the economic impacts of the recreational fishing industry. Updated effort and catch data are already included in this Supplemental EIS. Data regarding the economic impacts of the recreational fishing industry were also included in the 2012-2017 WPA/CPA Multisale EIS; there are no updates to this data at this time.

API 1-44 Comment noted. The text of the Final Supplemental EIS has been revised to address the comment.

API 1-45 Comment noted.

API 1-46 **Table 2-1** was deleted from this Supplemental EIS. The alternative and mitigation tracking table has been placed on BOEM's website at http://www.boem.gov/5-year/2012-2017/Tracking-Table/.

API 1-47 The statement regarding the number of birds collected has support from currently available data. However, this statement has not been subject to peer review and relies on data from Gulf of Mexico studies addressing the statement that have not yet been published. The raw data have been made publicly available through FWS's website. The NRDA studies on this issue are to be published sometime in the future, although a timeline is not yet available for when these studies will be made publicly available. Therefore, this statement is preliminary but supported by the raw data that are available.

ConocoPhillips Company
P. O. Box 2197
Houston, Texas 77252-2197

VIA E-MAIL: LS_233-231SEIS@boem.gov

December 18, 2012

Mr. Gary D. Goeke
Chief, Regional Assessment Section,
Office of the Environment (GM 623E)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, Louisiana 70123-2394

Subject: Comments on the Draft Supplemental EIA, WPA Sale 233 and CPA Sale 231

Dear Mr. Goeke:

ConocoPhillips Company (ConocoPhillips) is pleased to provide comments on the Draft Supplemental Environmental Impact Statement (DSEIS) for Outer Continental Shelf (OCS) Western Planning Area (WPA) Lease Sale 233 and Central Planning Area (CPA) Lease Sale 231 published November 2012 by the U.S. Department of Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region (BOEM).

ConocoPhillips is one of North America's leading energy producers, and one of our primary strategic objectives is to produce more oil and natural gas in the United States. We are a leading producer of natural gas in the United States, the largest producer of oil in Alaska, and among Canada's largest producers of natural gas (much of which flows to the United States). ConocoPhillips conducts exploration activities in 19 countries and produces hydrocarbons in 13 countries, including the United States OCS. ConocoPhillips is known worldwide for its technological expertise in deepwater exploration and production, reservoir management and exploitation and 3-D seismic technology. ConocoPhillips has participated in and plans to continue to participate in multiple wells in the deepwater Gulf of Mexico. In addition, ConocoPhillips bid over $112,527,663 Million on 90 blocks at the OCS CPA Lease Sale 216/222 held on June 20, 2012 and the OCS WPA Lease Sale 229 held on November 28, 2012. These and other OCS activities reflect ConocoPhillips' commitment and continued interest in the BOEM's offshore leasing programs.

Relative to the BOEM Regional Director's Note: ConocoPhillips believes that the DSEIS addresses the potential changes to the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development and production in the WPA and CPA since publication of the 2012-2017 Multisale Environmental Impact Statement in which WPA Lease Sale 233 and CPA Lease Sale 231 are scheduled under. ConocoPhillips agrees that the DSEIS was prepared using the best information that was publicly available at the time the document was prepared.

CONOCO-1

Of the alternatives set forth in the DSEIS for WPA Lease Sale 233, ConocoPhillips supports Alternative A which would offer for lease all unleased blocks within the WPA for oil and gas operations, except the whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary; and whole and partial blocks that lie within the 1.4-nautical-mile buffer zone north of the maritime boundary between the U.S. and Mexico. ConocoPhillips does not support Alternatives B and C set forth in the DSEIS.

CONOCO-2

Of the alternatives set forth in the DSEIS for CPA Lease Sale 231, ConocoPhillips supports Alternative A which would offer for lease all unleased blocks within the CPA for oil and gas operations, except the whole and partial blocks deferred by the Gulf of Mexico Energy Securities Act of 2006; blocks that are beyond the United States Exclusive Economic Zone in the area known as the Eastern Gap and whole and partial blocks that lie within the 1.4-nautical-mile buffer zone north of the maritime boundary between the U.S. and Mexico. ConocoPhillips does not support Alternatives B and C set forth in the DSEIS.

As stated in the DSEIS: The cancellation of either WPA Lease Sale 233 or CPA Lease Sale 231 would likely only defer any resulting oil and gas development from such sale to a later date as the cancellation of all future Lease Sales in the WPA and CPA is not expected. Therefore, cancellation of WPA Lease Sale 233 and CPA Lease Sale 231 would only reduce the overall level of activity in the WPA and CPA by a small percentage, if any. Cancellation of proposed WPA Lease Sale 233 and CPA Lease Sale 231 would however result in adverse direct economic impacts to individual companies and the Federal Government.

ConocoPhillips agrees with the comments stated in the DSEIS as set forth above. The WPA and CPA contain potentially significant resources and conducting WPA Lease Sale 233 and CPA Lease Sale 231 is vitally important to America's energy security. In addition, the OCS contains potentially significant, untapped resources of oil and natural gas that are critically important to sustaining our national economic growth and maintaining much-needed jobs in virtually every sector of the economy. ConocoPhillips' continued commitment to the OCS will largely depend on the extent to which the BOEM's Oil and Gas Leasing Program makes high potential areas available for leasing.

CONOCO-3

ConocoPhillips supports Alternative A as set forth in the Draft SEIS for WPA Sale 233 and CPA 231 and appreciates the opportunity to comment on such DSEIS. Should you have any questions, please contact Jim Higgins at (281) 293-3139.

Sincerely,

Richard Lunam
Vice President, North America Exploration

Conoco-1 Comments noted.

Conoco-2 Comment noted. If the ASLM's decision is to hold a proposed lease sale in the WPA under Alternative A, it will be announced in the Final Notice of Sale.

Conoco-3 If the ASLM's decision is to hold a proposed lease sale in the CPA under Alternative A, it will be announced in the Final Notice of Sale.

Conoco-4 Refer to the responses to comments Conoco-2 and Conoco-3.

MANASOTA – 88

A Project for Environmental Quality 1968 - 2088

Mr. Gary D. Goeke, Chief
Regional 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

December 16, 2012

Re: Comments on the WP A 233/CPA 231 Draft Supplemental EIS

Dear Mr. Goeke:

MS-1

ManaSota-88 recommends exclusion of all areas of the Central and Western Gulf of Mexico for any new oil and gas leasing areas for the OCS Gas and Oil Leasing Program.

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 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 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. These preliminary steps have not been taken. Existing scientific data is incomplete and outdated due to the environmental impacts from the Deepwater Horizon oil spill. This Draft Supplemental EIS does not adequately analyze relevant new information regarding the Deepwater Horizon event.

Information
P.O. Box 1728
Nokomis, FL 34274
(941) 966-6256
FAX (941) 966-0659
www.manasota88.org

MS-3 U.S. Department of the Interior Bureau 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 "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 Not Adequately Addressed in the Draft Supplemental Environmental Impact Statement for Oil and Gas Proposed Western Planning Area Lease Sale 233 and Proposed Central Planning Area Lease Sale 231.

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- 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 nonpoint and point sources of pollution. 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.

2

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.

Fair Market Value Options

The approach of the current OCS Leasing Program has been an economic and environmental failure.

MS-12 The U.S. Department of the Interior Bureau 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 Bureau (DOIB). 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 DOIB contracts. Therefore, the proposed leases 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 DOIB has not been able to adequately monitor for and control the environmental degradation resulting from offshore leasing activities.

MS-14 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-15 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.

MS-16 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.

Potential Impacts to Tourism and Recreation Activities

MS-17 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

MS-17

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 Florida's coast.

Accidental Oil Spills

MS-18

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-19

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.

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-20

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.

Hurricanes

MS-21

Hurricanes can and have caused oil spills.

There is no reason to believe that future oil drilling will protect the nations economy

MS-21 and environment from the potentially serious environmental damage associated with offshore oil drilling and onshore oil spills associated with hurricanes.

Seagrass Communities

MS-22 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.

MS-23 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.

Chemosynthetic And Nonchemosynthetic Communities

MS-24 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.

Sea Turtles

MS-25 All five species of sea turtles exist within Gulf of Mexico. 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.

Onshore Health and Environmental Impacts

MS-26 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-27 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.

MS-28 Processing and oil separation require large volumes of water. The addition of one or several gas processing plants in Florida will have significant impacts on local water supplies.

MS-29 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.

Coastal and Marine Birds

MS-30 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.

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-31 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.

MS-32 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.

Offshore Environmental Impacts

MS-33 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-34 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 has and is happening with the Deepwater Horizon oil spill, including damage to the tidal marshes, our coastal sea grasses, forested and non-forested wetlands, and mangroves.

Sincerely,

Glen Compton

Chairman, ManaSota-88

MS-1 Comment noted. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the Federal Register.

MS-2 Chapter 1.6 of this Supplemental EIS and Chapter 1.6 of the 2012-2017 WPA/CPA Multisale EIS contain information regarding BOEM's Environmental Studies Program, which has funded more than 875 completed or ongoing environmental studies since its establishment in 1973.

This Supplemental EIS and the 2012-2017 WPA/CPA Multisale EIS identify and incorporate information relevant to the potential significant impacts that may result from the WPA and CPA proposed actions, including information available since the Deepwater Horizon explosion, oil spill, and cleanup. Nevertheless, as acknowledged in this Supplemental EIS and the 2012-2017 WPA/CPA Multisale EIS, credible scientific data regarding the potential short-term and long-term impacts of the Deepwater Horizon explosion, oil spill, and cleanup are incomplete. In accordance with Section 1502.22 of the CEQ regulations implementing NEPA, when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an EIS and when there is incomplete or unavailable information, the agency shall always make clear that such information is lacking. However, NEPA does not require that all informational gaps be addressed before an EIS is completed and a decision is made. As discussed in Chapters 4.1 and 4.2 of this Supplemental EIS and in Chapters 4.1 and 4.2 of the 2012-2017 WPA/CPA Multisale EIS, in light of the absence of this information, BOEM considered what incomplete or unavailable information was relevant to the assessment of impacts and essential to its analysis of alternatives based upon the resource analyzed. If essential to a reasoned choice among the alternatives, BOEM considered whether it was possible to obtain the information, if the cost of obtaining it is exorbitant, and if it cannot be obtained, applied acceptable scientific methodologies to inform the analysis in light of this incomplete or unavailable information. For example, conclusive information on many impacts of the Deepwater Horizon explosion, oil spill, and cleanup, particularly as part of the NRDA process, may not be available for years, and certainly not within the contemplated timeframe of this NEPA process. In its place, subject-matter experts have used the scientifically credible information available and the accepted scientific methodologies to evaluate impacts to the resources while this information is unavailable. BOEM's subject-matter experts in the individual resource analyses have identified for the decisionmaker and the public where there is incomplete or unavailable information and explained whether it was relevant to impact analyses; whether it was essential to a reasoned choice among alternatives, where appropriate; whether the information could be obtained; and what scientific information was available and applied in its stead.

MS-3 Drilling safety is of the highest priority to the missions of BOEM and BSEE, and significant enhancements to drilling safety have been implemented in the years since the Deepwater Horizon explosion, oil spill, and cleanup. Chapter 1.3.1 of the 2012-2017 WPA/CPA Multisale EIS, which is incorporated by reference herein, provides detailed descriptions of the administrative and regulatory changes made by this Agency following the Deepwater Horizon explosion, oil spill, and cleanup, all of which are designed to minimize the risk of future blowouts and oil spills. Chapter 1.3.1 of the 2012-2017 WPA/CPA Multisale EIS also describes the regulatory framework related to drilling safety on the OCS. Refer also to the response to comment MS-2.

MS-4 Chapter 2.2.2 describes mitigation measures applied to avoid or minimize environmental and socioeconomic impacts related to OCS activities. Mitigating measures are a standard part of BOEM's program to ensure that the operations are always conducted in an environmentally sound manner (with an emphasis on minimizing any adverse impact of routine operations on the environment).

Refer also to the response to comment MS-3.

MS-5 Chapter 3.1 of this Supplemental EIS and Chapter 3.1 of the 2012-2017 WPA/CPA Multisale EIS provide detailed descriptions of the impact-producing factors and scenario for routine operations, including refineries, exploration and delineation plans 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 factors are used in the cumulative impacts analyses for environmental and socioeconomic resources 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 this Supplemental EIS and 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 for 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. Refer also to the response to comment MS-2.

MS-7 Chapters 4.1 and 4.2 of this Supplemental EIS and Chapters 4.1 and 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, both 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 explosion, oil spill, and cleanup.

MS-8 BOEM has developed robust analyses on the potential impacts from the WPA and CPA proposed actions, both in the 2012-2017 WPA/CPA Multisale EIS and in this Supplemental EIS. With both of these NEPA analyses, BOEM has complied with the letter and spirit of NEPA, in that they provide full and fair discussion of significant environmental impacts that may result from the proposed actions and inform the decisionmakers and the public. Refer also to the response to comment MS-2.

MS-9 Chapters 4.1.1.2.1 and 4.2.1.2.1 state that "[t]he 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." The full analyses of the potential impacts of routine activities associated with the WPA and CPA proposed actions and the proposed actions' incremental contribution to the cumulative impacts from point-source and nonpoint-source runoff are presented in Chapters 4.1.1.2.1.2, 4.1.1.2.1.4, 4.2.1.2.1.2, and 4.2.1.2.1.4 of the 2012-2017 WPA/CPA Multisale EIS, respectively, which are incorporated by reference herein.

MS-10 As described in Chapter 4 of this Supplemental EIS and in 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 the economic incentives to tie into the existing pipeline network, rather than run new pipelines onshore.

MS-11 In keeping with its obligations under NEPA, BOEM considers the potential impacts of the WPA and CPA proposed actions and the OCS oil and gas program to all relevant resources, including those under State jurisdiction (see, for example, the chapters on coastal waters, coastal barrier beaches and associated dunes, wetlands, diamondback terrapins, and human resources and land use 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) and permit restrictions carried out by other agencies that minimize or avoid reasonably foreseeable effects of oil and gas activities in sensitive marine and coastal habitats.

MS-12 Comment noted. BOEM, through its National Resource Assessment Program, independently develops estimates of the remaining undiscovered oil and natural gas resources on the OCS. Resource estimates are developed independently by the BOEM Resource Evaluation Office in the Gulf of Mexico Region. The Resource Evaluation Office employs highly trained and

experienced staff of geologists, geophysicists, engineers, economist, statisticians and computer programmers using state-of-the-art geoscientific data interpretation tools and sophisticated probabilistic computer simulation modeling software developed and maintained by BOEM and proprietary to the U.S Government. Assuring receipt of Fair Market Value for every OCS tract leased to private industry is mandated by the OCS Lands Act and its amendments. The U.S. Department of the Interior, Bureau of Ocean Energy Management is the U.S. Government agency that is charged with the responsibility to fulfill this mandate.

To ensure that the government receives fair market value for the blocks receiving bids at OCS lease sales, BOEM exercises the bid adequacy procedures of its Lease Sale Fair Market Value Program. The Resource Evaluation Office in the Gulf of Mexico OCS Region performs an independent and comprehensive block-specific appraisal of the oil and gas potential and independent economic analyses of the potential resource volumes to determine the risked net present value of the blocks that receive bids at Gulf of Mexico OCS oil and gas lease sales.

MS-13 Comment noted. 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, BSEE's Environmental Enforcement Branch participates in real-time observation efforts during various OCS operations to monitor for the potential impacts on protected species, fish/fisheries, and benthic ecosystems. The Environmental Enforcement Branch's Environmental Enforcement Officers also conduct routine inspections on OCS facilities and MODU's to monitor emissions and discharge levels to determine their effect on air quality and coastal/marine waters. Additionally, the Environmental Enforcement Branch's field leads conduct environmental compliance research targeted at specific OCS activities and also participate as Contract Inspectors/field leads on BOEM's offshore/environmental resource studies. Ultimately, BOEM/BSEE's coordination ensures a continual pre- and post-activity feedback process that provides for adaptive management of the site-specific NEPA program and allows for value-added hind casting for the oversight of future programs.

Chapter 2.2.2 describes the mitigation measures applied to avoid or minimize environmental and socioeconomic impacts related to OCS activities. Mitigating measures are an integral part of BOEM's program to ensure that the operations are always conducted in an environmentally sound manner (with an emphasis on minimizing any adverse impact of routine operations on the environment).

Chapter 1.6 of this Supplemental EIS and Chapter 1.6 of the 2012-2017 WPA/CPA Multisale EIS contain information regarding BOEM's Environmental Studies Program, which has funded more than 875 completed or ongoing environmental studies since its establishment in 1973. These completed and ongoing studies are used to assess the potential and real effects of the Gulf of Mexico OCS Program. The BOEM-funded environmental studies, along with new information from other peer-reviewed resources, are used in the NEPA analyses.

MS-14 Comment noted. BOEM has added a paragraph that discusses the extent to which the Federal Government is receiving economic returns from lease sales to Chapters 4.1.1.20.3 and 4.2.1.23.3.

MS-15 Refer to the response to comment MS-13.

MS-16 Refer to the response to comment MS-14.

MS-17 Comment noted. BOEM has added paragraphs that discuss the extent to which BOEM is receiving proper returns from lease sales to Chapters 4.1.1.20.3 and 4.2.1.23.3. This information references BOEM's methodology for quantifying the economic costs of OCS lease sales, which entails quantifying some of the economic costs mentioned in this comment.

MS-18 Chapters 4.1 and 4.2 of this Supplemental EIS and Chapters 4.1 and 4.2 of the 2012-2017 WPA/CPA Multisale EIS include "Accidental Impacts" subheadings for each of the resources analyzed, including but not limited to wetlands, coastal waters, and fauna. In addition, since the Deepwater Horizon explosion, oil spill, and cleanup, BOEM has included impacts of catastrophic oil spills in its EIS's. For example, a low-probability catastrophic oil spill's potential impacts on wetlands are described in Chapters 4.1.1.4.3 and 4.2.1.4.3 of this Supplemental EIS and in Chapters 4.1.1.4.3 and 4.2.1.4.3 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS.

MS-19 Comment noted. Refer to the response to comment MS-18.

MS-20 The properties and persistence of different types of oils are described in Table 3-7. Chapters 4.1 and 4.2 of this Supplemental EIS and Chapters 4.1 and 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.

Impacts of oil spills to wetlands are more specifically described in detail in Chapter 4.2.1.4.3 of this Supplemental EIS and in Chapter 4.2.1.4.3 of the 2012-2017 WPA/CPA Multisale EIS. For a detailed discussion of oil impacts to benthic organisms, refer to Chapters 4.1.1.6, 4.1.1.10, 4.2.1.6, 4.2.1.7, and 4.2.1.11 of this Supplemental EIS and to Chapters 4.1.1.6, 4.1.1.10, 4.2.1.6, 4.2.1.7, and 4.2.1.11 of the 2012-2017 WPA/CPA Multisale EIS.

MS-21 Comment noted. Chapter 3.1.1.7.4.1 of the 2012-2017 WPA/CPA Multisale EIS discusses the cause of spills and volume from a 10-year period (1998 through 2007). It acknowledges the association between hurricanes and platform spills and between hurricanes and pipeline spills. Chapters 1.3.1.1 and 1.5 of the 2012-2017 WPA/CPA Multisale EIS also provide information related to NTL 2011-G01, "Hurricane and Tropical Storm Effects Reports," and the emergency plans and facility shut-ins as a result of severe weather events.

MS-22 BOEM does not believe that the statement "Oil spills occurring near a seagrass community will require long term cleanup and the impacts would be permanent in nature" is a valid assessment. Chapters 4.1.1.5.3 and 4.2.1.5.3 of this Supplemental EIS and Chapters 4.1.1.5.3 and 4.2.1.5.3 of the 2012-2017 WPA/CPA Multisale EIS provide detailed descriptions of accidental events on seagrass communities, including cleanup activities and recovery following oil spills.

MS-23 Comment noted. Chapters 4.1.1.5.2 and 4.2.1.5.2 of this Supplemental EIS and Chapters 4.1.1.5.2 and 4.2.1.5.2 of the 2012-2017 WPA/CPA Multisale EIS describe impacts of these types of activities on seagrass communities.

MS-24 While knowledge about deep-sea benthic communities is evolving, there have been two BOEM-funded studies that provide extensive background information on deepwater Gulf of Mexico habitat and biological communities (Gallaway et al., 1988; Rowe and Kennicutt, 2009). In addition, BOEM 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 oil and gas activity, become available.

The application of avoidance criteria for chemosynthetic communities described in NTL 2009-G40 precludes the placement of a well within 610 m (2,000 ft) of any suspected site of a chemosynthetic community 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 would limit the impacts of oil and gas activity to chemosynthetic and nonchemosynthetic communities. Refer also to Chapters 4.1.1.8, 4.1.1.9, 4.2.1.9 and 4.2.1.10 of this Supplemental EIS and to Chapters

4.1.1.8, 4.1.1.9, 4.2.1.9 and 4.2.1.10 of the 2012-2017 WPA/CPA Multisale EIS regarding the potential impacts to chemosynthetic and nonchemosynthetic communities.

Gallaway, B.J., L.R. Martin, and R.L. Howard, eds. 1988. Northern Gulf of Mexico continental slope study, annual report: Year 3. Volume II: Technical narrative. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 87-0060. 586 pp.

Rowe, G.T. and M.C. Kennicutt II, eds. 2009. Northern Gulf of Mexico continental slope habitats and benthic ecology study: Final report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2009-039. 456 pp.

MS-25 Comment noted. Chapters 4.1.1.12 and 4.2.1.13 of this Supplemental EIS and Chapters 4.1.1.12 and 4.2.1.13 of the 2012-2017 WPA/CPA Multisale EIS describe impacts of these types of activities on sea turtles.

MS-26 BOEM projects 0-1 new gas processing facilities and 0-1 new pipeline landfalls for the CPA proposed action, although this is a conservative estimate and the number is much closer to zero than to one. The same estimate holds for the WPA proposed action. It is important to point out that BOEM only permits infrastructure emplaced on the OCS, and infrastructure constructed in onshore coastal areas are regulated and permitted by the States pursuant to their Coastal Zone Management Programs and by Federal agencies such as the U.S. Army Corps of Engineers pursuant to the Clean Water Act or USEPA (or its State counterpart) under the Clean Air Act; and under their control and jurisdiction, mitigation can be and is frequently required. Nevertheless, the potential impacts of onshore infrastructure related to the WPA and CPA proposed actions are considered in Chapters 4.1 and 4.2 of this Supplemental EIS and in Chapters 4.1 and 4.2 of the 2012-2017 WPA/CPA Multisale EIS.

MS-27 Comment noted. Refer to the response to comment MS-26, as well as the air quality analyses provided in Chapters 4.1.1.1 and 4.2.1.1 of this Supplemental and in Chapters 4.1.1.1 and 4.2.1.1 of the 2012-2017 WPA/CPA Multisale EIS.

MS-28 Comment noted. Refer to the response to comment MS-26. Although no new gas processing plants are anticipated to be constructed as a result of the WPA and CPA proposed actions, should a processing plant be constructed, it would unlikely be constructed in Florida due to its distance from other existing oil and gas infrastructure.

MS-29 Comment noted. Refer to the response to comment MS-23. BOEM does consider the construction of infrastructure in the resource analyses in Chapters 4.1 and 4.2 of this Supplemental EIS and in Chapters 4.1 and 4.2 of the 2012-2017 WPA/CPA Multisale EIS.

No new refineries are expected to be constructed as a result of the WPA and CPA proposed actions. Although the CPA scenario states that 0-1 new gas processing facilities may be constructed as a result of a CPA or WPA proposed action, the likelihood has moved closer to zero and farther from one. Existing plants have either been underutilized and have excess capacity or existing facilities would be expanded well before building new facilities.

MS-30 The comment mentions several impacts from routine and accidental events (though the comment referred to them together as “routine oil and gas operations”). Regardless, both routine and accidental impacts from the proposed WPA and CPA lease sales are described in Chapters 4.1.1.14 and 4.2.1.16 of this Supplemental EIS and in Chapters 4.1.1.14 and 4.2.1.16 of the 2012-2017 WPA/CPA Multisale EIS. The comment addresses only species listed as endangered or threatened, but incorrectly states that the brown pelican is listed (it was delisted in 2009). The descriptions of routine impacts on coastal and marine birds provides analyses for both threatened and endangered species and nonlisted species as

impact-producing factors are similar. Therefore, those impacts analyzed for listed and unlisted species are treated together as one group (coastal and marine birds), with additional information on impacts that may be specific to listed species.

As a note of clarification, the comment's mention of "permanent [routine] impacts on . . . food supply" are addressed (but using different terminology) in this Supplemental EIS. This Supplemental EIS states, "The impacts include the following . . . secondary impacts from pipeline and navigation canals to coastal habitats, which will occur over the long term and may ultimately displace species to other habitats, assuming comparable (quality) habitats are available." Here, habitats include foraging habitats (food supply).

MS-31 Comment noted. The baselines for these resources are described under the headings "Affected Environment" in Chapters 4.1 and 4.2 of this Supplemental EIS and in Chapters 4.1 and 4.2 of the 2012-2017 WPA/CPA Multisale EIS.

MS-32 Comment noted. Impacts from these types of activities are analyzed and discussed in Chapters 4.1.1.15.2 and 4.2.1.18.2 of this Supplemental EIS and in Chapters 4.1.1.15.2 and 4.2.1.18.2 of the 2012-2017 WPA/CPA Multisale EIS.

MS-33 Comment noted. Impacts from these types of activities are analyzed and discussed in Chapters 4.1.1.15.2 and 4.2.1.18.2 of this Supplemental EIS and in Chapters 4.1.1.15.2 and 4.2.1.18.2 2 of the 2012-2017 WPA/CPA Multisale EIS.

MS-34 Comment noted. Prior EIS's issued by BOEM are outside of the scope of this Supplemental EIS with the exception of the Five-Year Program EIS and the 2012-2017 WPA/CPA Multisale EIS, from which this Supplemental EIS tiers. Nevertheless, BOEM notes that it continually endeavors to improve in the execution of its duties under NEPA and to provide the most robust and informative NEPA analyses as possible for the decisionmaker and public. BOEM believes that this Supplemental EIS meets the Agency's obligations under NEPA and continues to evidence BOEM's emphasis on improvement with each EIS.

121 Woodland Circle
Ocean Springs, MS 39564
December 11, 1012

Mr. Gary D. Goeke, Chief
Regional Assessment Section
Office of Environment (GM 623E)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2374

"Comments on the WPA 233/CPA 231 Draft Supplemental EIS"

Dear Mr. Goeke:

BARNES-1 BARNES-2 BARNES-3

The Sierra Club, Chamber of Commerce, 12-Mile South Coalition, Harrison County Board of Supervisors, many other environmental groups, as well as concerned citizens oppose this questionable project of drilling within 12 miles of the Mississippi Gulf Coast.

When visitors come to our coast, they do not want to see oil rigs. They do not want to have to find a safe haven when 'sour gas' escapes from oil rigs and it will.

Why does anyone want to destroy our money making Tourism Industry? This certainly will happen if you allow drilling closer than the 12 mile limit requested.

I am a tax paying citizen of the Mississippi Gulf Coast for over 70 years, retired from the federal government and now volunteer with numerous civic organizations.

Sarah Barnes

Sarah Barnes
228-872-3821

Barnes-1 Comment noted.

Barnes-2 Comment noted.

Barnes-3 Comment noted. BOEM has added a statement to **Chapter 4.2.1.21** regarding the scale of the tourism industry along the Mississippi coastline. BOEM also added a statement to **Chapter 4.2.1.21** regarding the difficulty of quantifying the dependence of Mississippi's tourism industry on the Gulf Islands National Seashore.

BROTHERTON-1

To Whom it may concern

As a resident living on the Gulf of Mexico I am concerned about plans to lease or sell more portions of the Gulf to oil companies. Oil companies have many off shore leases they are not using. The Bottom Line is they want to get closer to our shores to lim. their expenses. They say it will create 50Bs - it will do the same if they use what they already have. Have we learned nothing from the BP spill? I urge you not to sell more properties to the oil companies

Sincerely

Ms. Augustine Brotherton
P.O. Box 80
Horseshoe Beach, Fl.
32648

Brotherton-1 Comment noted.

Rowe, Casey J

From: Carroll Campbell <carrollcampbell99@gmail.com>
Sent: Monday, December 24, 2012 1:55 PM
To: LS_233-231-SEIS, BOEM
Subject: comments--WPA and CPA leases

Dear Sir or Madam,

The purpose of this letter is to present my suggestions on the proposed Western Planning Area Lease Sale 233 and Central Planning Area Lease Sale 231 in the Gulf of Mexico. According to the BOEM 2012-105 Document, "Draft Supplemental Environmental Impact Statement," an "Alternative C" is offered as an option for both WPA 233 and CPA 231: No action on either lease sale, thus precluding both the resource extraction and ecological impacts that would ensue under the A and B alternatives. Alternative C would also forestall negative economic impacts. Oil and gas drilling this close to our barrier islands and coast would be completely wrong for South Mississippi's ecology, economy, and human population, and perhaps even disastrous. It would also be wrong for the public interest on a national scale. I will first advocate that Alternative C be taken as the best option in the national and local interest. Next, I will explain my view that the second best option is Alternative B; I would further ask BOEM to consider that drilling should at least be restricted to outside of twelve miles south of the barrier islands of Mississippi, thus creating a buffer zone for the Gulf Coast similar to those that already benefit Florida and Alabama.

CAMP-1

Alternative C for WPA and CPA is the Best Option for the Public Good from an Economic Standpoint; This Applies Both Nationally and Locally

CAMP-2

The Center for Sustainable Economy is currently suing the Obama administration over the economic aspects of this SEIS. Journalist Farron Cousins reports that CSE finds that the SEIS is strongly biased in favor of the oil and gas industry and against the public good that BOEM is supposed to protect--and this is in terms of the economy, and not the ecology. It would seem that the costs of new oil and gas extraction from a lease sale far outweigh the benefit to the public good. The December 19, 2012 article, "Group Sues Obama Administration Over Offshore Oil and Gas Leasing Program," which appeared on Desmogblog.com, points out the following: "...[illegible] for the amount of money to be made from oil and gas in these areas ranges from $1 to $2 billion per year. However, these areas currently provide an economic boost of as much as $70 billion a year from fishing, tourism, and other activities, all of which could be decimated in the event of an oil spill." [illegible] Clearly, it's tourism and fisheries that are the principal economic drivers in the Gulf South, and not oil and gas. Government policy should preserve and enhance these aspects of our economy, not allow oil and gas industrial practices to impair or endanger them.

CAMP-3

This article goes on to point out the following: "[illegible] that the best possible outcome from oil and gas exploration would be 14.3 billion barrels – enough to meet all U.S. needs (using solely those barrels) for a paltry 10 months. The lowest estimates show only 5.75 billion barrels, which is the U.S. demand for a little less than 4 months." [illegible] Thus the gain in oil extracted through new leases would not be significant with respect to national need, and thus not clearly in the public interest. Moreover, more stringent fuel economy standards or more carpooling and improved mass transit that would preclude the need for cars could easily make up for loss of this ten-month supply of oil. Moreover, there are public costs associated with subsidies that would no doubt be provided to the oil and gas companies at a time when our economy is going through an unstable recovery--and that would be an unwise use of taxpayer money. In fact, that subsidies are provided at all to these extravagantly profitable companies is rather absurd. If BP, for example, can earn 18 billion profit in one fiscal quarter alone, then clearly oil and gas companies can afford to self-finance their activities with no federal help. In any event, with Alternative C, the public cost of federal subsidies would be mitigated.

The kind of drilling most likely to affect Coastal Mississippi is gas drilling, as our oil reserves are not thought to be at all significant. According to a Mississippi Mineral Resource Institute study released in 2004, and often cited by the Mississippi Development Authority, Mississippi has some 350 billion cubic feet of natural gas reserves, a relatively small quantity compared to Alabama, which has reserves estimated at 6.5 trillion cubic feet--and even this is considered relatively modest. Gas development in Alabama waters has, indeed, been economically beneficial to the state economy and to tax revenues. Some of Alabama's wells provide resource extraction at the rate of up to 110 million cubic feet per day, bringing in tax revenue at a rate of $500 million per year.

This would not be the case for Mississippi. Mississippi's gas reserves are 1/17th the size of Alabama's, and they would be exhausted in a matter of 20 years. This statistic and those in the preceding paragraph are according Jeff Bounds' updated study of this issue, "Drilling by the Numbers, Again: the Economic Impact of Gas Exploration Offshore of Mississippi," (http://12milessouthcoalition.com/uploads/DrillbyNos.pdf) Bounds writes that US yearly demand for natural gas is 25 trillion cubic feet. According to Mr. Bounds, extraction of Mississippi's entire reserves would yield enough natural gas to supply the US for between three

CAMP-4

and four and a half days. Mississippi tax revenues would be between $6 and 11 million yearly, and thus not hugely beneficial to our state. The dollar value of the gas would be between $33 million and $60 million yearly, so it's not clear that the corporate profits from extraction would be all that profitable, especially in a context of cheap, abundant natural gas from fracking. As Mr. Bounds earlier suggested, we must continue to ask why we and the rest of our nation would want to sacrifice the well-being of our ecosystem and the Gulf Islands National Seashore, a national treasure, for this paltry return? Tourism is the chief economic engine of Coastal Mississippi, and our tourism industry depends on a healthy ecology--pristine islands and safe, healthy seafood. Thus, I advocate Alternative C as the best option for Mississippians, not extracting this gas when the new shale extraction methods have made natural gas so cheap. Let's not exhaust this small reserve instead of conserving it for the future.

CAMP-5

The United States is, in fact, producing so much natural gas that we are about to enter the export market for this fossil fuel, so the domestic need does not justify this extraction. Instead, let's save these reserves by leaving them untouched so that the may be available for future generations by pursuing Alternative C.

The Public Interest Would Be Better Served by Pursuing Greater Conservation and a Renewables Economy Sector

Finally, there are other activities the U.S. government could support with regard to energy that would be much more in the public interest than increased fossil fuel extraction. The United States must disengage from this fossil fuel economy because the impacts of global warming are becoming ever more costly in terms of both our national economy, the American ecology, and the health and well-being of American citizens. This has been quite clear for decades. However, we have yet in this country to see a meaningful, systematized drive for greater conservation through the many means that are available to us--LEED buildings; retrofitting; increased mass transit; recycling. Furthermore, let's better serve the national interest by pursuing renewable energy rather than endanger valuable ecosystems such as that protected by the Gulf Islands National Seashore. Moreover, a large-scale turn to renewables, promoted and subsidized by our government, would create an entirely new sector of non-exportable jobs for American workers. Let's turn nationally towards conservation and renewables rather than pursue more extraction and burning of fossil fuels in WPA and CPA.

CAMP-6

As the public benefit of regular economic gains from tourism, fishing, and additional activities is quite vast, and as the preclusion taxpayer-financed oil and gas subsidies would be made possible by Alternative C, and as the current glut of cheap natural gas does not justify gas drilling in the Gulf, we must question the wisdom of allowing new oil and gas leases to go forward at all in WPA and CPA. Alternative C is the best course of action in terms of the economic benefit to the pubic good both nationally and locally.

Alternative C for WPA and CPA is the Best Option for the Public Good from an Ecological and Environmental Standpoint

Hydrogen Sulfide Leaks a Danger to Public Health and Welfare

CAMP-7

It is clear that Alternative C is the best option when the potential for toxic hydrogen sulfide leaks that occur in the context of gas drilling are considered. On Dauphin Island, off of Alabama, periodic accidental releases of toxic hydrogen sulfide gas are such a regular occurrence that the island has a warning system in place, and detailed response and evacuation plans. Similar warning systems must be instituted for tourists who happen to plan trips out to the islands, and rescue plans must also be put into place. Wildlife on the islands, however, will not be protected by these measures. Alternative C is the best option, but Alternative B is a good second choice, as it will limit the impacts to wildlife. Restricting drilling to the area outside of 12 miles south of the Gulf's barrier islands would be an excellent measure to protect both humans and wildlife.

Alternative C Would protect a National Treasure, the Gulf Islands National Seashore, and Mississippi's Tourism Economy

CAMP-8

I've seen photographs and heard many anecdotal reports of the rigs off of Dauphin Island off of Alabama. The rigs are ugly, and according to my friends' accounts, noisy and unsightly. Nobody's going to want to visit South Mississippi or our barrier islands with unsightly oil platforms and noisy, smelly ship traffic passing back and forth. Debris and waste from the rigs will wash up on the shores of our islands and coastal beaches.

In fact, the Gulf Islands National Seashore is a national park and a national treasure that attracts thousands of visitors each year from the United States and abroad. I have heard it compared to the Grand Canyon in terms of its ecological importance. It protects the habitat of osprey, varieties of heron and egret, owls, alligators, raccoons, possum, fox, dolphins, sharks, and numerous other species, and it promotes public understanding of our ecology. Our waters and bayous are the nurseries and habitats of fish, oysters, crab and shrimp that, prior to the DH horizon disaster, provided the nation with up to 60% of its seafood. In other words, our Gulf has traditionally been a major source of food and also a major economic driver of Mississippi and the US economy.

Visitors and locals value the educational and recreational aspects of this national park; they appreciate it for its inherent value as a peaceful and virtually pristine space that allows them contact with nature, along with peace, quiet, and the opportunity for contemplation

and enrichment. That is certainly what I love about the park. On the other hand, rigs and platforms along Mississippi's coast also mean more pipelines, more industrial ship traffic, and a greater risk for accidents like the BP drilling disaster. These would be a great discouragement to tourism, and further pollution from these activities will only further damage our already impaired ecosystem, which is the basis of our fishing industry in the Gulf of Mexico.

CAMP-9

Meanwhile, the dangers of another disastrous oil spill loom--and this would further cripple our marine ecology, and thus diminish the public good good in terms of the economic and recreational benefits. Further impacts to our Gulf from major leaks would endanger a major source of our food supply.

Alternative B the Second Choice

CAMP-10

If Alternative C is not followed, then I would recommend Alternative B, The Proposed Action Excluding the Blocks Near Biologically Sensitive Topographic Features. I would add that a buffer zone of 12 nautical miles must be extended south from the barrier islands for their protection and preservation.

The Evacuation Stipulation Must Apply

CAMP-11

In view of the dangers of hydrogen sulfide leaks resulting from gas drilling, or severe oil leaks that may cause oil to come ashore in large quantities, the evacuation stipulation must apply in order to protect the health and well-being of local populations and tourists.

The Protected Species Stipulation Must Apply

CAMP-12

According to NOAA, dolphins and whales to died at twice the normal rate in 2011 following the DH disaster and Corexit application ("2010–2011 Cetacean Unusual Mortality Event in Northern Gulf of Mexico – Office of Protected Resources – NOAA Fisheries". Nmfs.noaa.gov. 1 November 2011. Retrieved 2011-11-05.) Alternative C is thus the best choice to protect our marine animals. Seismic testing for oil and gas reserves will substantially endanger them further, as the process is well-known for disrupting their homing sense and even causing premature death due to ruptured ear drums.

CAMP-13

Alternative B protects environmentally sensitive areas, yet it must be pointed out that marine animals are not bound by geography. They will be affected by whatever results from the seismic testing, drilling and extraction processes. Marine animals will be harmed or killed due to seismic testing that will be done in advance of any drilling, and this has been well documented and reported in the national media. Please see the following paper and articles for further information:

* http://www.anp.gov.br/brasil-rounds/round7/round7/guias_r7/sismica_r7/biblio_R7/Gordon%20et%20al%202004%20-%20review%20seismic%20effects%20marine%20mammals.pdf

* http://www.indybay.org/newsitems/2012/11/14/18725659.php

* http://www.forbes.com/sites/jeffmcmahon/2012/08/27/whales-intervene-in-nuclear-plants-seismic-testing/

Additional Stipulation: Dispersants Must be Tested and and Their Use Regulated

CAMP-14

Dispersants such as Corexit must be tested and regulated by the United States government. Shockingly, the dispersant Corexit, whose toxicological properties had never been tested by the US government, was lavishly applied in our Gulf in the aftermath of the Deepwater Horizon.

CAMP-15

Two million gallons of Corexit dispersant was applied in response to the Deepwater Horizon 4-million-barrel gusher. It later was found the Corexit made the spill 52 times more toxic than it would have been without its application (see Science Recorder, December 1, 2012; http://www.sciencerecorder.com/news/study-mixing-oil-with-dispersant-made-the-bp-oil-spill-worse/). Corexit made the oil "disappear" by dissolving it into the water column, with "plumes" of oil resulting a it was carried over ever-greater areas of the Gulf. The dispersal of the oil into tiny droplets increased its bio-availability to microscopic aquatic life, the basis of the marine food web. The results of the combination of Macondo oil and Corexit are still unknown, and at this time very suspect. We have seen massive marine mammal die-offs and mysterious illnesses and deformities plaguing Gulf fish and shellfish.

CAMP-16 Corexit has been tested and in fact banned in many other oil-producing nations. Norway, for example, has banned the use of Corexit in response to oil spills. These countries rely instead on strong safety measures at the drilling sites, as well as stringent government oversight, to protect their marine habitat and shores from oil spills--and thus their economies. Rather than rely on the application of dangerous toxic chemicals, superior mechanical requirements should be mandated for all oil drilling operations.

CAMP-17 If we must use dispersants, then an additional stipulation for CPA 231 must be that lessees are surveilled and regulated by an entity such as the Coast Guard as they apply the dispersants. This would be in the national interest, as it would help protect the natural resources that belong to the American people; it would also support national security concerns, as a serious enough disaster could potentially cause entire populations to be sickened or to have to be evacuated--at great public and private expense.

CAMP-18 Also, it would be in the national interest if better regulation and supervision of lessees should be stipulated throughout the drilling process to ensure that mishaps such as the one that caused the Deepwater Horizon explosion do not recur. The White House Oil Spill Commission found that the DH explosion resulted from cost-cutting decisions on the part of BP and its subcontractors. (^ "Obama oil spill commission's final report blames disaster on cost-cutting by BP and partners". *The Daily Telegraph*. 5 January 2011.) If new leases are to go forward in the CPA, then no expense must be spared in protecting the nation's resources in the Gulf.

CAMP-19 The rigs most certainly need better oversight by federal authorities. Ideally, federal authorities could be placed on site at the rigs full-time to monitor the lessees' activities. Federally mandated checklists for safe drilling must also be put into place.

Additionally, Stipulate that Better Spill Response Measures be Created and Instituted

After the Deepwater Horizon disaster, the American public observed a pitiful process characterized by the use of almost completely ineffectual boom and two ridiculous domes whose power to contain the massive disaster was virtually nil, followed by the lavish application of toxic Corexit dispersant and an ineffectual Top Kill (whose potential effectiveness had earlier been misrepresented to the public). The gusher, which began on April 20, 2011, was not successfully stopped until the well was finally killed on September 4, 2011--meaning five months of gushing oil released into our Gulf. Disturbingly, the cleanup efforts of the Ixtoc I explosion in Mexico thirty years earlier were precisely the same: boom, domes, and dispersant.

CAMP-20 In view of the fact that oil spill response and clean-up strategies have not changed in thirty years, it must be stipulated that new and more effectual methods of immediate clean-up be created to protect our Gulf.

A Buffer Zone Would Serve National and Local Interests

CAMP-21 Florida and Alabama have buffer zones in place already. I suggest that a buffer zone extending 12 nautical miles south of the Gulf's barrier islands--in particular, the Gulf Islands National Seashore, a national park and national treasure--would greatly serve the local and national interest. A buffer zone would protect the Seashore from pollution caused by oil spills, and thus protect this national park; it would protect the Mississippi Coast's substantial economy by keeping rigs and other structures out of view of the islands. It would protect our fisheries by putting more distance between spilled oil and the estuaries that serve as the nurseries for our crab, fish, shrimp and oysters.

SUMMARY

CAMP-22 Please consider Alternative C as the best choice for the Public Good. Please consider that Alternative C serves the public good both in terms of the economy and the ecology at both the national and local levels. Please remember that BOEM exists to protect the public good, not the profits of oil and gas industry. Otherwise, Alternative B is the second-best option, with the stipulations recommended above. Moreover, a 12-nautical-mile buffer zone extending from the barrier islands in WPA and CPA waters would greatly protect this important national treasure.

Camp-1 Comment noted. **Chapters 2.3.3 and 2.4.3** addresses the summary of impacts related to "Alternative C—No Action" for proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231. These chapters acknowledges that, if proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231 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 activity in the WPA and CPA would be only reduced by a small percentage, if any. However, the cancellation of the proposed WPA and CPA lease sales may result in direct economic impacts to the individual companies, and the revenues collected by the Federal Government (and thus revenue disbursements to the States) would also be adversely affected.

Camp-2 Comment noted. BOEM has added information that discusses the extent to which the Federal Government is receiving economic returns from lease sales to **Chapters 4.1.1.20.3 and 4.2.1.23.3**. In **Chapter 4.2.1.21**, BOEM has also added information related to a study to that outlines some of the commenter's concerns, although the study relates to leasing offshore of Mississippi specifically.

Camp-3 Comment noted. Refer to the response to comment Camp-2. Most of the alternatives that the commenter cites are outside of the scope of this NEPA analysis or would fall within the same category of impacts expected to result from Alternative C, which as noted in **Chapter 4** would still result in some negative environmental impacts through the necessity to develop or import alternative supplies. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the *Federal Register*.

Camp-4 Refer to the response to comment Camp-2. In addition, the potential impacts to tourism are described in **Chapters 4.1.1.18 and 4.2.1.21** of this Supplemental EIS and in Chapters 4.1.1.18 and 4.2.1.21 of the 2012-2017 WPA/CPA Multisale EIS.

Camp-5 Refer to the response to comment Camp-2.

Camp-6 Refer to the responses to comments Camp-1 and Camp-2. The potential impacts to resources identified by the commenter are fully described in **Chapters 4.1 and 4.2** of this Supplemental EIS and in Chapters 4.1 and 4.2 of the 2012-2017 WPA/CPA Multisale EIS. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the *Federal Register*.

Camp-7 Comments noted. If the ASLM's decision is to hold a proposed lease sale under Alternative B, it will be announced in the Final Notice of Sale. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the *Federal Register*. Nevertheless, as noted in the discussion of the potential air quality impacts of the WPA and CPA proposed actions in **Chapters 4.1.1.1 and 4.2.1.1** of this Supplemental EIS and in Chapters 4.1.1.1 and 4.2.1.1 of the 2012-2017 WPA/CPA Multisale EIS, before operations can begin, an operator must submit an H_2S contingency plan to BSEE's District Manager for approval.

Camp-8 BOEM has added additional information to **Chapter 4.1.2.21** regarding the impacts of the OCS Program on the Gulf Islands National Seashore. BOEM has also added a reference that discusses the impacts of oil and gas activities in Baldwin County, Alabama. Additional detailed information regarding the routine impacts of the OCS Program on recreational resources in the CPA can be found in **Chapter 4.2.1.21.2** of this Supplemental EIS and in Chapter 4.2.1.21.2 of the 2012-2017 WPA/CPA Multisale EIS. The potential impacts to habitat, species, and fisheries are described in **Chapters 4.1 and 4.2** of this Supplemental EIS and in Chapters 4.1 and 4.2 of the 2012-2017 WPA/CPA Multisale EIS and this Supplemental EIS. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the *Federal Register*.

Camp-9 A spill of the magnitude of the *Deepwater Horizon* oil spill is not a reasonably foreseeable occurrence. Indeed, the likelihood of another spill on this scale is exceedingly low, made even more so by BSEE's promulgation of new drilling and safety regulations and the ongoing endeavors to advance containment strategies. Chapter 1.3.1 of the 2012-2017 WPA/CPA Multisale EIS, as updated in this Supplemental EIS, provides detailed descriptions of the administrative and regulatory changes made by this Agency following the *Deepwater Horizon* explosion, oil spill, and cleanup, all of which are designed to minimize the risk of future blowouts and oil spills. Nevertheless, as part of its NEPA analysis, BOEM has included an evaluation of the potential impacts in the event a low-probability, catastrophic spill event does occur; refer to Appendix B of the 2012-2017 WPA/CPA Multisale EIS.

Camp-10 Comments noted. If the ASLM's decision is to hold a proposed lease sale under Alternative B or with a buffer or other modification, it will be announced in the Final Notice of Sale. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the *Federal Register*.

Camp-11 The Evacuation Stipulation does not apply to hydrogen sulfide leaks but rather the potential interference of tactical military operations (refer to Chapter 2.4.1.3.4 of the 2012-2017 WPA/CPA Multisale EIS for a description of the Evacuation Stipulation). 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.

Refer to the response to comment Camp-7.

Camp-12 Comment noted. The potential impacts to marine mammals and the current information on the continuing UME are described in **Chapters 4.1.1.11 and 4.2.1.12** of this Supplemental EIS and in Chapters 4.1.1.11 and 4.2.1.12 of the 2012-2017 WPA/CPA Multisale EIS. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the *Federal Register*.

Camp-13 Comment noted. Refer to the response to comment Camp-12. BOEM's subject-matter experts have included the scientifically credible information that is relevant to their analyses and that is of use to the decisionmaker and the public in evaluating the proposed actions and alternatives. If the ASLM's decision is to hold a proposed lease sale under Alternative B and/or to apply the Protected Species Stipulation, it will be announced in the Final Notice of Sale.

Camp-14 Decisions regarding the study and use of dispersants are outside of the scope of the WPA and CPA proposed actions and this NEPA analysis. Subpart J of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) stipulates the criteria for listing and managing the use of dispersants and other chemical and biological agents used to mitigate oil spills and was in effect prior to the *Deepwater Horizon* explosion, oil spill, and cleanup. The USEPA prepares and maintains the NCP's Product Schedule (For copies of the regulation and the product schedule, visit USEPA's Subpart J—NCP Product Schedule website at http://www.epa.gov/oem/content/ncp/index.htm. During a spill event, unless the use of dispersant is preauthorized, it is the responsibility of the Federal On-Scene Coordinator, with concurrence as appropriate of USEPA and the Regional Response Team, to determine if dispersants can be applied, which dispersants may be used, under what circumstances, and for how long (refer to 40 CFR 300.910). The On-Scene Coordinator is the Federal official predesignated by USEPA or USCG to coordinate and direct responses in the event of a qualifying spill. Nevertheless, the use and potential impacts from dispersants are discussed in **Chapters 4.1 and 4.2** of this Supplemental EIS and in Chapters 4.1 and 4.2 and Appendix B of the 2012-2017 WPA/CPA Multisale EIS.

Camp-15 Refer to the response to comment Camp-14. **Chapter 4.2.1.2.2** of this Supplemental EIS and Chapter 4.2.1.2.2.1 of the 2012-2017 WPA/CPA Multisale EIS provide detailed discussions

on the use of dispersants during the *Deepwater Horizon* explosion, oil spill, and cleanup and the formation of plumes.

Camp-16 Refer to the response to comment Camp-14. Subsea containment requirements and capabilities, which best represent the requested superior mechanical requirements, are discussed in Chapter 3.2.1.9 of the 2012-2017 WPA/CPA Multisale EIS, which is incorporated by reference.

Camp-17 Refer to the response to comment Camp-14.

Camp-18 Refer to the response to comment Camp-9.

Camp-19 Comment noted. Refer to the response to comment Camp-9. The BSEE is tasked with the enforcement of safety and environmental regulations of OCS oil and gas structures and activities. The BSEE has developed a robust inspections program to monitor and enforce requirements on the OCS. Nevertheless, a proposal to include full-time inspectors on each of the thousands of fixed and mobile structures used in OCS oil and gas activities is outside of the scope of this Supplemental EIS and is outside the jurisdiction of BOEM.

Camp-20 A discussion of oil-spill containment and cleanup options, constraints, and capabilities, as well as emerging technologies, is included in Chapter 3.2.1.9 of the 2012-2017 WPA/CPA Multisale EIS, as updated by this Supplemental EIS. In addition, BSEE has recently published NTL 2012-BSEE-N06, "Guidance to Owners and Operators of Offshore Facilities Seaward of the Coast Line Concerning Regional Oil Spill Response Plans," which became effective on August 10, 2012. This NTL provides clarifications of and encourages practices that are based on lessons learned from the *Deepwater Horizon* explosion, oil spill, and cleanup. During BSEE's review of regional OSRP's, the Oil Spill Response Division will analyze the content of the submitted OSRP's to ensure that the lessees demonstrate the ability to respond quickly and effectively whenever oil is discharged from a covered facility, as required by 30 CFR 254.

Camp-21 The Gulf of Mexico Energy Security Act of 2006 placed a deferral on blocks that were previously included within the Eastern Planning Area and that are within 100 mi (161 km) of the Florida Coast. There are no currently identified buffers or lease block deferrals off the coast of Alabama, although the Blocks South of Baldwin County, Alabama, Stipulation does encourage lessees to minimize the visual impacts near shore. **Chapter 4.2.1.21** describes information related to the potential recreational and economic impacts of OCS activities on the Gulf Islands National Seashore and Gulf Islands Wilderness Area. Refer also to the responses to comments ADEM-1 and NPS-1 through NPS-3.

If the ASLM's decision is to hold a proposed lease sale with a buffer or other modification to the proposed action alternatives, it will be announced in the Final Notice of Sale.

Camp-22 Comments noted. Refer to the response to comment Camp-21.

If the ASLM's decision is to hold a proposed lease sale under Alternatives A or B, it will be announced in the Final Notice of Sale. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the *Federal Register*.

Rowe, Casey J

From: Jonathon Giuffria <jmg410@msstate.edu>
Sent: Wednesday, December 05, 2012 11:45 AM
To: LS_233-231-SEIS
Subject: Oil and Natural Gas Leasing in the MS Sound.

GIUFFRIA-1

Dear Mr. Gary D. Goeke,

Being a MS Coast Native, I strongly oppose any oil or natural gas exploration, testing, for extraction within 12 nautical miles of Mississippi's barrier islands. Therefore, I urge the Bureau of Ocean Energy Management (BOEM) to approve Alternative Action C for the proposed Central Planning Area (CPA) Lease Sale 231 which would cancel the proposed Central Planning Area (CPA) Lease Sale 231.

Drilling within 12 nautical miles of the barriers islands would be visible to residents and tourists visiting the Coast and Gulf Islands National Seashore. Drilling activity would risk polluting sensitive waters, and would risk damage that could lead to complete loss of the barrier islands which provide all Mississippians with historical, economic, and environmental benefits.

GIUFFRIA-2

The economic benefits of tourism provided by the Mississippi Gulf Coast and Gulf Islands National Seashore is threatened by the proposed CPA Lease Sale 231. The economic benefits of the proposed CPA Lease Sale 231 are outweighed by the economic losses due to decreases in tourism that would result from drilling within 12 nautical miles of Mississippi's barrier islands. Furthermore, Mississippi Gulf Coast and Gulf Islands National Seashore tourism can be a permanent and lasting source of income for Mississippians if we protect it, but oil and gas extraction will eventually come to an end, leaving the coast and its residents without a consistent, reliable, and sustainable source of income. Additionally, the possibility of an accident, especially an oil spill or natural gas explosion would only add to the stigma caused by the BP Deepwater Horizon disaster.

It is for these reasons that I urge the Bureau of Ocean Energy Management (BOEM) to approve Alternative Action C for the proposed Central Planning Area (CPA) Lease Sale 231 which would cancel the proposed Central Planning Area (CPA) Lease Sale 231.

Thank you for your time.

Sincerely,
Jonathon Giuffria
6054 Daughtery Road
Long Beach, MS 39560

Giuffria-1 Comment noted. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the *Federal Register*.

Giuffria-2 Comment noted. BOEM has added information to **Chapter 4.2.1.21** related to a study that outlines some of the commenter's concerns related to leasing offshore Mississippi. Please also refer to the responses to comments NPS-1 through NPS-3. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the *Federal Register*.

Rowe, Casey J

From:	jean public <jeanpublic1@gmail.com>
Sent:	Friday, November 09, 2012 9:25 AM
To:	LS_233-231-SEIS; president@whitehouse.gov; speakerboehner@mail.house.gov; info@emagazine.com
Cc:	letters@newsweek.com; today@nbc.com
Subject:	PUBLIC COMMENT ON FEDERAL REGISTER Fwd: tell me again how great obama protects the environment please

JP-1

I OPPOSE GRANTING THESE LEASES. IT IS CLEAR THAT WE HAVE NO ENVIRONMENTAL PROTECTION THAT IS SUFFICENT TO PROTECT OURSELVES FROM THE EFFECT OF TOXIC OIL. I BELIEVE OUR PRESENT GOVT IS A PATSY FOR BIG OIL PROFITEERS AND THE PUBLIC IS BEING RAKED OVER AND OUR ENVIRONMENT DESTROYED BY BIG OIL. THIS COMMENT IS FOR THE PUBLIC RECORD. JEAN PUBLIC

[Federal Register Volume 77, Number 218 (Friday, November 9, 2012)]
[Notices]
[Pages 67394-67395]
From the Federal Register Online via the Government Printing Office [www.gpo.gov]
[FR Doc No: 2012-27519]

DEPARTMENT OF THE INTERIOR

Bureau of Ocean Energy Management

Gulf of Mexico (GOM), Outer Continental Shelf (OCS), Western Planning Area (WPA) Lease Sale 233 and Central Planning Area (CPA) Lease Sale 231, Oil and Gas Lease Sales

AGENCY: Bureau of Ocean Energy Management (BOEM), Interior.

ACTION: Notice of Availability (NOA) of the Draft Supplemental Environmental Impact Statement (EIS) and Public Meetings.

Authority: This NOA is published pursuant to the regulations (40 CFR 1503) implementing the provisions of the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 et seq.).

SUMMARY: BOEM has prepared a Draft Supplemental EIS for oil and gas lease sales tentatively scheduled in 2013 and 2014 in the WPA and CPA offshore the States of Texas, Louisiana, Mississippi, and Alabama. This Draft Supplemental EIS updates the environmental and socioeconomic analyses for proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231, which was completed in July 2012, as part of the 2012-2017 Multisale EIS. The 2012-2017 Multisale EIS covers planning areas in the Gulf of Mexico OCS Oil and Gas Lease Sales: Western Planning Area Lease

Sales 229, 233, 238, 246, and 248; and Central Planning Area Lease Sales 227, 231, 235, 241, and 247.

SUPPLEMENTARY INFORMATION: BOEM developed this Draft Supplemental EIS for proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231 to consider new information made available since completion of the 2012-2017 Multisale EIS and to consider, among other things, new information in light of the Deepwater Horizon event. This Draft Supplemental EIS provides updates on the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the WPA and CPA. BOEM conducted an extensive search for new information in consideration of the Deepwater Horizon event, reviewing scientific journals, available scientific data, and information from academic institutions and Federal, State, and local agencies. BOEM also interviewed personnel from academic institutions and Federal, State, and local agencies. BOEM has examined the potential impacts of routine activities and accidental events, and the proposed lease sales' incremental contribution to the cumulative impacts on environmental and socioeconomic resources.

Draft Supplemental EIS Availability: BOEM has printed and will distribute a limited number of paper copies of the Draft Supplemental EIS. In keeping with the Department of the Interior's mission of protecting natural resources, and to limit costs while ensuring availability of the document to the public, BOEM will primarily distribute digital copies of this Draft Supplemental EIS on compact discs. If you require a paper copy and copies are still available, BOEM will provide one upon request.

You may request a copy of the Draft Supplemental EIS from the Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, Public Information

[[Page 67395]]

Office (GM 250G), 1201 Elmwood Park Boulevard, Room 250, New Orleans, Louisiana 70123-2394 (1-800-200-GULF).

You may download or view the Draft Supplemental EIS on BOEM's Internet Web site at http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/nepaprocess.aspx.

Several libraries along the Gulf Coast have been sent copies of the Draft Supplemental EIS. To find out which libraries have copies of the Draft Supplemental EIS for review, you may contact BOEM's Public Information Office (phone number and address above) or visit BOEM's Internet Web site at http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/nepaprocess.aspx.

Comments: Federal, state, and local government agencies and other interested parties are requested to send their written comments on the Draft Supplemental EIS in one of the following two ways:

1. In an envelope labeled ``Comments on the Draft Supplemental EIS'' and mailed (or hand carried) to Mr. Gary D. Goeke, Chief, Regional 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.

2. To the following BOEM email address: LS 233-231SEIS@boem.gov.

Comments should be submitted no later than December 24, 2012.

Public Meetings: BOEM also will hold public meetings to obtain comments regarding the Draft Supplemental EIS. These meetings are scheduled as follows:

Houston, Texas: December 03, 2012, Houston Airport Marriott at George Bush Intercontinental, 18700 John F. Kennedy Boulevard, Houston, Texas 77032, beginning at 1:00 p.m. CST;

New Orleans, Louisiana: December 04, 2012, Bureau of Ocean Energy Management, 1201 Elmwood Park Boulevard, New Orleans, Louisiana

70123, beginning at 1:00 p.m. CST;
Gulfport, Mississippi: December 05, 2012, Courtyard by Marriott Gulfport Beachfront MS Hotel, 1600 East Beach Boulevard, Gulfport, Mississippi 39501, beginning at 1:00 CST;
Mobile, Alabama: December 06, 2012, Five Rivers--Alabama's Delta Resource Center, 30945 Five Rivers Boulevard, Spanish Fort, Alabama 36527, beginning at 1:00 p.m. CST.

FOR FURTHER INFORMATION CONTACT: For more information on the Draft Supplemental EIS, you may contact Mr. Gary D. Goeke, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, Office of Environment (GM623E), 1201 Elmwood Park Boulevard, New Orleans, Louisiana 70123-2394 or by email at LS 233-231SEIS@boem.gov. You may also contact Mr. Goeke by telephone at (504) 736-3233.

Public Disclosure of Names and Addresses

Before including your address, phone number, email address, or other personal identifying information in your comment, please be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

Dated: November 6, 2012.
Tommy P. Beaudreau,
Director, Bureau of Ocean Energy Management.
[FR Doc. 2012-27519 Filed 11-8-12; 8:45 am]
BILLING CODE 4310-MR-P

JP1-1 Comment noted. Chapter 1.3.1 of the 2012-2017 WPA/CPA Multisale EIS, as updated by this Supplemental EIS, provides detailed descriptions of the administrative and regulatory changes made by this Agency following the Deepwater Horizon explosion, oil spill, and cleanup, all of which are designed to minimize the risk of future blowouts and oil spills.

Rowe, Casey J

From:	jean public <jeanpublic1@gmail.com>
Sent:	Saturday, November 10, 2012 2:41 PM
To:	LS_233-231-SEIS; president@whitehouse.gov; speakerboehner@mail.house.gov; letters@newsweek.com
Cc:	info@emagazine.com; INFO@EARTHJUSTICE.ORG; INFO@DEFENDERS.ORG; info@oceana.org; info@opsociety.org; info@seashepherd.org
Subject:	PUBLI C COMMENT ON FEDERAL REGISTER

JP2-1

I OPPOSE SELING THESE OIL LEASES AS MOST OF AMERICA DOES. WE ARE AWARE THAT THE OIL COMPANIES WHO GET THESE LEASES ALWAYS HAVE EXCUSES ON WHY THEY CANT CAP THE ONES THAT GET AWAY. WE ARE SICK AND TIRED OF OUR GULF GETTING MASSACRED BY OIL PROFITEERS,WHO THEN RETIRE ON $200 MILLION A YEAR PENSIONS. THE CORRUPTION AND POLLUTION OF THE OIL PROFITEERS IS ENORMOUS AND IRREVERSIBLEY BAD FOR THE ENVIRONMENT. THIS COMMENT IS FOR THE PUBLIC RECORD. JEAN PUBLICg

[Federal Register Volume 77, Number 218 (Friday, November 9, 2012)]
[Notices]
[Pages 67394-67395]
From the Federal Register Online via the Government Printing Office [www.gpo.gov]
[FR Doc No: 2012-27518]

DEPARTMENT OF THE INTERIOR

Bureau of Ocean Energy Management

Gulf of Mexico (GOM), Outer Continental Shelf (OCS), Western Planning Area (WPA) Lease Sale 233 and Central Planning Area (CPA) Lease Sale 231, Oil and Gas Lease Sales

AGENCY: Bureau of Ocean Energy Management (BOEM), Interior.

ACTION: Notice of Availability (NOA) of the Draft Supplemental Environmental Impact Statement (EIS) and Public Meetings.

Authority: This NOA is published pursuant to the regulations (40 CFR 1503) implementing the provisions of the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321 et seq.).

SUMMARY: BOEM has prepared a Draft Supplemental EIS for oil and gas lease sales tentatively scheduled in 2013 and 2014 in the WPA and CPA offshore the States of Texas, Louisiana, Mississippi, and Alabama. This Draft Supplemental EIS updates the environmental and socioeconomic analyses for proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231, which was completed in July 2012, as part of the 2012-2017 Multisale EIS. The 2012-2017 Multisale EIS covers planning areas in the Gulf of Mexico OCS Oil and Gas Lease Sales: Western Planning Area Lease Sales 229, 233, 238, 246, and 248; and Central Planning Area Lease

Sales 227, 231, 235, 241, and 247.

SUPPLEMENTARY INFORMATION: BOEM developed this Draft Supplemental EIS for proposed WPA Lease Sale 233 and proposed CPA Lease Sale 231 to consider new information made available since completion of the 2012-2017 Multisale EIS and to consider, among other things, new information in light of the Deepwater Horizon event. This Draft Supplemental EIS provides updates on the baseline conditions and potential environmental effects of oil and natural gas leasing, exploration, development, and production in the WPA and CPA. BOEM conducted an extensive search for new information in consideration of the Deepwater Horizon event, reviewing scientific journals, available scientific data, and information from academic institutions and Federal, State, and local agencies. BOEM also interviewed personnel from academic institutions and Federal, State, and local agencies. BOEM has examined the potential impacts of routine activities and accidental events, and the proposed lease sales' incremental contribution to the cumulative impacts on environmental and socioeconomic resources.

Draft Supplemental EIS Availability: BOEM has printed and will distribute a limited number of paper copies of the Draft Supplemental EIS. In keeping with the Department of the Interior's mission of protecting natural resources, and to limit costs while ensuring availability of the document to the public, BOEM will primarily distribute digital copies of this Draft Supplemental EIS on compact discs. If you require a paper copy and copies are still available, BOEM will provide one upon request.

You may request a copy of the Draft Supplemental EIS from the Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, Public Information

[[Page 67395]]

Office (GM 250G), 1201 Elmwood Park Boulevard, Room 250, New Orleans, Louisiana 70123-2394 (1-800-200-GULF).

You may download or view the Draft Supplemental EIS on BOEM's Internet Web site at http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/nepaprocess.aspx.

Several libraries along the Gulf Coast have been sent copies of the Draft Supplemental EIS. To find out which libraries have copies of the Draft Supplemental EIS for review, you may contact BOEM's Public Information Office (phone number and address above) or visit BOEM's Internet Web site at http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/NEPA/nepaprocess.aspx.

Comments: Federal, state, and local government agencies and other interested parties are requested to send their written comments on the Draft Supplemental EIS in one of the following two ways:

1. In an envelope labeled ``Comments on the Draft Supplemental EIS'' and mailed (or hand carried) to Mr. Gary D. Goeke, Chief, Regional 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.

2. To the following BOEM email address: LS_233-231SEIS@boem.gov.

Comments should be submitted no later than December 24, 2012.

Public Meetings: BOEM also will hold public meetings to obtain comments regarding the Draft Supplemental EIS. These meetings are scheduled as follows:

Houston, Texas: December 03, 2012, Houston Airport Marriott at George Bush Intercontinental, 18700 John F. Kennedy Boulevard, Houston, Texas 77032, beginning at 1:00 p.m. CST;

New Orleans, Louisiana: December 04, 2012, Bureau of Ocean Energy Management, 1201 Elmwood Park Boulevard, New Orleans, Louisiana 70123, beginning at 1:00 p.m. CST;

Gulfport, Mississippi: December 05, 2012, Courtyard by Marriott Gulfport Beachfront MS Hotel, 1600 East Beach Boulevard, Gulfport, Mississippi 39501, beginning at 1:00 CST;

Mobile, Alabama: December 06, 2012, Five Rivers--Alabama's Delta Resource Center, 30945 Five Rivers Boulevard, Spanish Fort, Alabama 36527, beginning at 1:00 p.m. CST.

FOR FURTHER INFORMATION CONTACT: For more information on the Draft Supplemental EIS, you may contact Mr. Gary D. Goeke, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, Office of Environment (GM623E), 1201 Elmwood Park Boulevard, New Orleans, Louisiana 70123-2394 or by email at LS 233-231SEIS@boem.gov. You may also contact Mr. Goeke by telephone at (504) 736-3233.

Public Disclosure of Names and Addresses

Before including your address, phone number, email address, or other personal identifying information in your comment, please be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold from public review your personal identifying information, we cannot guarantee that we will be able to do so.

Dated: November 6, 2012.
Tommy P. Beaudreau,
Director, Bureau of Ocean Energy Management.
[FR Doc. 2012-27519 Filed 11-8-12; 8:45 am]
BILLING CODE 4310-MR-P

JP2-1 Comment noted. If the ASLM's decision is to hold a proposed lease sale, it will be announced in the Final Notice of Sale. If the ASLM's decision is to cancel a proposed lease sale under Alternative C, a Notice of Cancellation will be published in the Federal Register.

13400 Pulpwood Road
Ocean Springs, MS 39565
December 21, 2012

Reference Supplemental EIS for Gulf of Mexico OCS Oil and Gas Lease Sales
In the Western and Central Planning Areas
(WPA Lease Sale 233 and CPA Lease Sale 231)

MASSEY-1

We understand our governor, former governor and MDA want to issue leases in the Mississippi Sound in clear sight of the Mississippi Gulf Coast. Oil rigs in plain view will have a detrimental effect to this million dollar industry. Tourist do not come to the sand beaches of Mississippi to see monstrosities of oil rigs and platforms.

The oil and gas companies have not been good stewards of the environment. With their actions, they have shown no regard to human life, to the wildlife, fisheries and habitat. They send false media reports on the continuously leaking of the Macondo Well as well as other abandoned and other wells in the Gulf.

We cannot believe NOAA, MDR, EPA, USCG, BOEM and other agencies who have all issued false and erroneous information to the public in reference to the BP Spill and Corexit used to disperse the oil, which incidentally did not work.

Most members of my family DO NOT eat Gulf seafood. Can you wonder why?

Sincerely,

Lori Massey

Lori Massey
228-392-8869

Massey-1 Comments noted. BOEM has no jurisdiction over lease sales in Mississippi State waters, including Mississippi Sound. Refer also to the responses to comments Camp-13, Camp-14, and NPS-1.

13002 Pulpwood Road
Ocean Springs, MS 39565
228-396-2241
December 17, 2012

U.S. Department of the Interior
Bureau of Ocean Energy Management
Public Meeting for the Supplemental Environmental Impact Statement (EIS)
for the Gulf of Mexico OCS Oil and Gas Lease Sales
in the Western and Central Planning Areas
(WPA Lease Sale 233 and CPA Lease Sale 231)

TO WHOM IT MAY CONCERN:

MATTA -1

As a life long resident of the Mississippi Gulf Coast, I am whole heartily against drilling in the Mississippi Sound.

MATTA -2

Not only are there **NOT** enough safety regulations in place to prevent spills or explosions, the oil companies have an unproven record of **NOT** being able to contain and clean up, without the loss of life, loss of habitat, loss of wildlife and marine life and the detrimental effects to the environment.

But most of all, is the harm and loss of tourism dollars that will affect the livelihood of thousands involved in this industry. Who in their right, mind that comes to the Mississippi Gulf Coast for the beauty of the beaches, sand, etc., want to look at oil rigs in their view?

The statistics are there! And they do not support the oil and gas companies in their quest for the small amount of oil and natural gas that will not make the drilling economically feasible. We do not need more natural gas; not at the price it will cost to all concerns here.

Since you, Governor Bryant, former Governor Barbour, MDA and others want drilling, why not put your oil derricks on the front lawn of the Mississippi Capitol? Since the aforementioned people are so adamant to drill in front view of the Mississippi Gulf Coast, why not give them a taste of their own medicine?

Sincerely,

Willena R. Matta

Willena R. Matta

Matta-1 Comment noted. BOEM has no jurisdiction over lease sales in Mississippi State waters, including Mississippi Sound. Refer also to the responses to comments Camp-13, Camp-14, and NPS-1.

Matta-2 Comment noted. Chapter 1.3.1 of the 2012-2017 WPA/CPA Multisale EIS provides detailed descriptions of the administrative and regulatory changes made by this Agency following the *Deepwater Horizon* explosion, oil spill, and cleanup, all of which are designed to minimize the risk of future blowouts and oil spills. The potential impacts to tourism are fully evaluated in Chapter 4.2.1.21 of the 2012-2017 WPA/CPA Multisale EIS, as updated by this Supplemental EIS.

A discussion of oil-spill containment and cleanup options, constraints, and capabilities is included in Chapter 3.2.1.9 of the 2012-2017 WPA/CPA Multisale EIS, as updated by this Supplemental EIS. In addition, BSEE has recently published NTL 2012-BSEE-N06, "Guidance to Owners and Operators of Offshore Facilities Seaward of the Coast Line Concerning Regional Oil Spill Response Plans," which became effective on August 10, 2012. This NTL provides clarifications of and encourages practices that are based on lessons learned from the *Deepwater Horizon* explosion, oil spill, and cleanup. During BSEE's review of regional OSRP's, the Oil Spill Response Division will analyze the content of the submitted OSRP's to ensure that the lessees demonstrate the ability to respond quickly and effectively whenever oil is discharged from a covered facility, as required by 30 CFR 254.

CHAPTER 6

REFERENCES CITED

6. REFERENCES CITED

Agalliu, I. 2011. Comparative assessment of the federal oil and gas fiscal systems. Prepared under BOEM Contract No. M10PC00090. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Herndon, VA. xviii + 300 pp.

Albers, P.H. 2006. Birds and polycyclic aromatic hydrocarbons. Avian and Poultry Biology Reviews 17:125-140.

Alexander, K. 2010. The 2010 oil spill: Criminal liability under wildlife laws. Congressional Research Report to Congress, Report Number 7-5700 (R41308), Washington, DC. 13 pp. Internet website: http://www.fas.org/sgp/crs/misc/R41308.pdf. Accessed September 1, 2010.

Allan S.E., B.W. Smith, and K.A. Anderson. 2012. Impact of the *Deepwater Horizon* oil spill on bioavailable polycyclic aromatic hydrocarbons in Gulf of Mexico coastal waters. Environmental Science & Technology 46(4):2033-9.

Alonso-Alvarez, C., I. Munilla, M. Lopez-Alonso, and A. Velando. 2007a. Sublethal toxicity of the *Prestige* oil spill on yellow-legged gulls. Environment International 33:773-781.

Anderson, C.M, M. Mayes, and R. LaBelle. 2012. Oil-spill occurrence rates for oil-spill risk analysis (OSRA). Internet website: http://www.boem.gov/Environmental-Stewardship/Environmental-Assessment/Oil-Spill-Modeling/Oil-Spill-Occurence-Rate-for-Oil-Spill-Risk-Analysis-(OSRA).aspx. Accessed August 6, 2012.

Arnold, T.W. and R.M. Zink. 2011. Collision mortality has no discernable effect on population trends of North American birds. PLoS ONE 6(9), 6 pp. Internet website: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0024708;jsessionid=2750268D5AD6D804B0653274AFF32D60.ambra02. Accessed September 12, 2011.

Atauz, A.D., W. Bryant, T. Jones, and B. Phaneuf. 2006. Mica shipwreck project: Deepwater archaeological investigation of a 19th century shipwreck in the Gulf of Mexico. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2006-072. 116 pp.

Bayne, E.M. and B.C. Dale. 2011. Effects of energy development on songbirds. In: Naugle, D.E., ed. Energy development and wildlife conservation in western North America. Washington, DC: Island Press. Pp. 95-114.

Bayne, E.M., L. Habib, and S. Boutin. 2008. Impacts of chronic anthropogenic noise from energy-sector activity on abundance of songbirds in the boreal forest. Conservation Biology 22:1186-1193.

Berg, J. 2006. A review of contaminant impacts on Gulf of Mexico sturgeon, *Acipenser oxyrinchus desotoi*. U.S. Dept. of the Interior, Fish and Wildlife Service, Panama City, FL.

Billings, R., B. Lange, and D. Wilson. 2012. Official communication. Emission estimates for Eastern Planning Area Sales 225-226. Memorandum to Holli Ensz, U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. Eastern Research Group, Inc., September 7, 2012. 9 pp.

Birkett, S.H. and D.J. Rapport. 1999. A stress-response assessment of the northwestern Gulf of Mexico ecosystem. In: Kumpf, H., K. Steidinger, and K. Sherman, eds. The Gulf of Mexico large marine ecosystem: Assessment, sustainability, and management. Malden, MA: Blackwell Science, Inc. Pp. 438-458.

Bounds, J. 2012. Drilling by the numbers, again: The economic impact of gas exploration offshore of Mississippi. Internet website: http://healthygulf.org/our-work/healthy-waters/drilling-on-mississippis-horizon. Accessed January 3, 2013.

Brooks, J.M., ed. 1991. Mississippi-Alabama continental shelf ecosystem study: Data summary and synthesis. Volume I: Executive summary and Volume II: Technical summary. U.S. Dept. of the

Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 91-0062 and 91-0063. 43 and 368 pp., respectively.

Brooks, J.M., C. Fisher, H. Roberts, B. Bernard, I. McDonald, R. Carney, S. Joye, E. Cordes, G. Wolff, and E. Goehring. 2009. Investigations of chemosynthetic communities on the lower continental slope of the Gulf of Mexico: Interim report 2. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2009-046. 360 pp.

Brown, A., K. Xia, K. Armbrust, G. Hagood, J. Jewell, D. Diaz, N. Gatian, and H. Folmer. 2011. Monitoring polycyclic aromatic hydrocarbons (PAHs) in seafood in Mississippi in response to the Gulf oil spill. Gulf Oil Spill SETAC Focused Topic Meeting, Pensacola, FL, April 26-28, 2011. Internet website: http://gulfoilspill.setac.org/sites/default/files/abstract-book-1.pdf. Accessed March 13, 2012.

Burdeau, C. and J. Reeves. 2012. APNewsBreak: Tests confirm oil came from BP. Internet website: http://bigstory.ap.org/article/apnewsbreak-tests-confirm-oil-came-bp-spill. Accessed September 24, 2012.

Burger, J. and M. Gochfeld. 2001. Effects of chemicals and pollution on seabirds. In: Schreiber, E.A. and J. Burger, eds. Biology of marine birds. Boca Raton, FL: CRC Press. Pp. 254-263.

Byrd, G.V., J.H. Reynolds, and P.L. Flint. 2009. Persistence rates and detection probabilities of bird carcasses on beaches of Unalaska Island, Alaska, following the wreck of the M/V *Selendang Ayu*. Marine Ornithology 37:197-204.

Caffey, R.H. and M. Schexnayder, eds. 2003. Coastal Louisiana and south Florida: A comparative wetland inventory; interpretive topic series on coastal wetland restoration in Louisiana, Coastal Wetland Planning, Protection, and Restoration Act. National Sea Grant Library. 8 pp.

Carls, M.G., S.D. Ricem, and J. Hose. 1999. Sensitivity of fish embryos to weathered crude oil: Part I. Low-level exposure during incubations causes malformations, genetic damage, and mortality in larval Pacific herring (*Clupea pallasi*). Environmental Toxicology and Chemistry 18 (3):481-493.

Chambers, J.R. 1992. Coastal degradation and fish population losses. In: Proceedings of the National Symposium of Fish Habitat Conservation, March 7-9, 1991, Baltimore, MD. 38 pp.

Chin, C.S. and J. Church. 2010. Field report: Fort Livingston, Grand Terre Island (September 9-10, 2010). National Center for Preservation Technology and Training, Natchitoches, LA. Internet website: http://www.ncptt.nps.gov/2011/field-report-fort-livingston-grand-terre-island/. Accessed March 18, 2011.

Church, R.A. and D.J. Warren. 2008. Viosca Knoll wreck: Discovery and investigation of an early nineteenth-century sailing ship in 2,000 feet of water. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2008-018. 41 pp.

Clark, R.B. 1982. The impact of oil pollution on marine populations, communities, and ecosystems: A summing up. Philosophical Transactions of the Royal Society of London B 297:433-443.

Continental Shelf Associates, Inc. (CSA). 1992a. Preliminary report of potential effects of oil spilled from Texaco's proposed pipeline from Platform A in Garden Banks Block 189 to the subsea tie-in with High Island Pipeline System's (HIPS) existing pipeline in High Island Area Block A-377 (modified route). Prepared for Texaco Pipeline, Inc., Jupiter, FL.

Continental Shelf Associates, Inc. (CSA). 1992b. Mississippi-Alabama shelf pinnacle trend habitat mapping study. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 92-0026. 114 pp. + 2 plates.

Continental Shelf Associates, Inc. (CSA). 1994. Analysis of potential effects of oil spilled from proposed structures associated with Oryx's High Island Block 384 unit on the biota of the East Flower Garden Bank and on the biota of Coffee Lump Bank. Prepared for Oryx Energy Company, Jupiter, FL.

Copeland, H.E., K.E. Doherty, D.E. Naugle, A. Pocewicz, and J.M. Kiesecker. 2009. Mapping oil and gas development potential in the US Intermountain West and estimating impacts to species. PLoS ONE 4(10), 7 pp. Internet website: http://www.plosone.org/article/fetchObjectAttachment.action;jsessionid=C4B6BAB5790BF3AD7E92948693EB8BB2?uri=info%3Adoi%2F10.1371%2Fjournal.pone.0007400&representation=PDF. Accessed July 14, 2010.

Costanza, R., O. Pérez-Maqueo, M.L. Martinez, P. Sutton, S.J. Anderson, and K. Mulder. 2008. The value of coastal wetlands for hurricane protection. Ambio 37:241-248.

Dauterive, L.D. 2000. Rigs-to-Reefs policy, progress, and perspective. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Report MMS 2000-073. 8 pp.

Deepwater Horizon Claims Center. 2012. Frequently asked questions. Internet website: http://www.deepwaterhorizoneconomicsettlement.com/faq.php. Accessed August 10, 2012.

Diaz, R.J. and A. Solow. 1999. Ecological and economic consequences of hypoxia. Topic 2 report for the Integrated Assessment on Hypoxia in the Gulf of Mexico. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, Coastal Ocean Program, Silver Spring, MD. NOAA Coastal Ocean Program Decision Analysis Series No. 16. 45 pp.

Dickey, R.W. 2012. FDA risk assessment of seafood contamination after the BP oil spill. Environmental Health Perspectives 120(2). February 2012. Internet website: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3279456/pdf/ehp.1104539.pdf. Accessed March 13, 2012.

Dismukes, D. 2011. Official communication. Email regarding scenario projections. Associate Director, LSU Center for Energy Studies, Baton Rouge, LA. June 29, 2011.

Dobbs, C.D. and J.M. Vozarik. 1983. Immediate effects of a storm on coastal infauna. Marine Ecology Progress Series 11:273-279.

Engle, V.D. 2011. Estimating the provision of ecosystem services by Gulf of Mexico coastal wetlands. Wetlands 31:179-193.

Engle, V.D., J.L. Hyland, and C. Cooksey. 2008. Effects of Hurricane Katrina on benthic macroinvertebrate communities along the northern Gulf of Mexico coast. Environmental Monitoring Assessment 150:193-209.

Environment Canada. 2011. Environmental Technology Centre. Oil properties database. Internet website: http://www.etc-cte.ec.gc.ca/databases/OilProperties/oil_prop_e.html. Accessed June 21, 2011.

Esler, D., J.A. Schmutz, R.L. Jarvis, and D.M. Mulcahy. 2000a. Winter survival of adult female harlequin ducks in relation to history of contamination by the *Exxon Valdez* oil spill. Journal of Wildlife Management 64:839-847.

Esler, D., T.D. Bowman, T.A. Dean, C.E. O'Clair, S.C. Jewett, and L.L. McDonald. 2000b. Correlates of harlequin duck densities during winter in Prince William Sound, Alaska. Condor 102:920-926.

Esler, D., T.D. Bowman, K.A. Trust, B.E. Ballachey, T.A. Dean, S.C. Jewett, and C.E. O'Clair. 2002. Harlequin duck population recovery following the *Exxon Valdez* oil spill: Progress, process and constraints. Marine Ecology Progress Series 241:271-286.

Faaborg, J., R.T. Holmes, A.D. Anders, K.L. Bildstein, K.M. Dugger, S.A. Gauthreaux, Jr., P. Heglund, K.A. Hobson, A.E. Jahn, D.H. Johnson, S.C. Latta, D.J. Levey, P.P. Marra, C.L. Merkord, E. Nol, S.I. Rothstein, T.W. Sherry, T.S. Sillett, F.R. Thompson III, and N. Warnock. 2010. Conserving migratory land birds in the New World: Do we know enough? Ecological Applications 20:398-418.

Fahrig, L. 1997. Relative effects of habitat loss and fragmentation on population extinction. Journal of Wildlife Management 61:603-610.

Fahrig, L. 1998. When does fragmentation of breeding habitat affect population survival? Ecological Modelling 105:273-292.

Federal Register. 2006. Oil and gas and sulphur operations in the outer continental shelf—Incident reporting requirements. Final rule. 71 FR 73, pp. 19640-19646. April 17, 2006. Internet website: http://www.gpo.gov/fdsys/pkg/FR-2006-04-17/pdf/06-3611.pdf.

Federal Register. 2011a. Reorganization of Title 30: Bureaus of Safety and Environmental Enforcement and Ocean Energy Management. 30 CFR Chapters II and V. Direct final rule. 76 FR 201, pp. 64432-64780. October 18, 2011. Internet website: http://www.gpo.gov/fdsys/pkg/FR-2011-10-18/pdf/2011-22675.pdf.

Federal Register. 2011b. Intent to prepare an environmental impact statement for sea turtle conservation and recovery actions and to conduct public scoping meetings. Notice of Intent. 76 FR 37050, pp. 37050-37052. Internet website: http://www.nmfs.noaa.gov/pr/pdfs/fr/fr76-37050.pdf.

Federal Register. 2012a. Oil and gas and sulphur operations on the outer continental shelf—Increased safety measures for energy development on the outer continental shelf. Final rule. 77 FR 163, pp. 50856-50901.

Federal Register. 2012b. Endangered and threatened wildlife and plants: Proposed listing determinations for 82 reef-building coral species; proposed reclassification of *Acropora palmata* and *Acropora cervicornis* from threatened to endangered. Proposed rule. 77 FR 236, pp. 73220-73262. December 7, 2012.

Fisher, C.R. 1995. Characterization of habitats and determination of growth rate and approximate ages of the chemosynthetic symbiont-containing fauna. In: MacDonald, I.R., W.W. Schroeder, and J.M. Brooks, eds. 1995. Chemosynthetic ecosystems study: Final report. Volume 2: Technical report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 95-0022. Pp. 5.1-5.47.

Fisher, M. 2012. Official communication. Email regarding the effort and catch data from Texas Parks and Wildlife Department data. Texas Parks and Wildlife Department.

Flint, P.L., A.C. Fowler, and R.F. Rockwell. 1999. Modeling bird mortality associated with the M/V *Citrus* oil spill off St. Paul Island, Alaska. Ecological Modelling 117:261-267.

Florida Fish and Wildlife Conservation Commission. 2012. Index nesting beach survey totals (1989-2011). Internet website: http://myfwc.com/research/wildlife/sea-turtles/nesting/beach-survey-totals/. Accessed April 4, 2012.

Fodrie, F.J. and K.L. Heck, Jr. 2011. Response of coastal fishes to the Gulf of Mexico oil disaster. PLoS ONE 6(7):e21609. doi:10.1371/journal.pone.0021609.

Foley, B. 2010. Impact of fishing on shipwrecks: In: Archaeology in deep water. Woods Hole Oceanographic Institution, Woods Hole, MA. Internet website: http://www.whoi.edu/sbl/liteSite.do?litesiteid=2740&articleId=4965. Accessed August 31, 2010.

Food and Agriculture Organization of the United Nations (FAO). 2008. Report of the FAO Workshop on Vulnerable Ecosystems and Destructive Fishing in Deep-sea Fisheries. Rome, 26-29 June 2007. FAO Fisheries Report No. 829. Rome: FAO. 18 pp. Internet website: ftp://ftp.fao.org/docrep/fao/010/i0150e/i0150e00.pdf.

Fox, A.D., M. Desholm, J. Kahlert, T.K. Christensen, and I.B.K. Petersen. 2006. Information needs to support environmental impact assessment of the effects of European marine offshore wind farms on birds. Ibis 148:129-144.

Fraser, G.S., J. Russell, and W.M. von Zharen. 2006. Produced water from offshore oil and gas installations on the Grand Banks, Newfoundland and Labrador: Are the potential effects to seabirds sufficiently known? Marine Ornithology 34:147-156.

Fucik, K.W., T.J. Bright, and K.S. Goodman. 1984. Measurements of damage, recovery, and rehabilitation of coral reefs exposed to oil. In: Cairns, J. and A.L. Buikema, Jr., eds. Restoration of habitats impacted by oil spills. Boston, MA: Butterworth Publishers. Pp. 115-133.

Galbraith, H., R. Jones, R. Park, J. Clough, S. Herrod-Julius, B. Harrington, and G. Page. 2002. Global climate change and sea level rise: Potential losses of intertidal habitat for shorebirds. Waterbirds 25:173-183.

Gaston, G.R., C.F. Rakocinski, S.S. Brown, and C.M. Cleveland. 1998. Trophic function in estuaries: Response of macrobenthos to natural and contaminant gradients. Marine and Freshwater Research 49:833-846.

Geraci, J.R. and D.J. St. Aubin. 1980. Offshore petroleum resource development and marine mammals: A review and research recommendations. Marine Fisheries Review 42:1-12.

Gittings, S.R., T.J. Bright, W.W. Schroeder, W.W. Sager, J.S. Laswell, and R. Rezak. 1992. Invertebrate assemblages and ecological controls on topographic features in the northeast Gulf of Mexico. Bulletin of Marine Science 50(3):435-455.

Greenberg, J. 2012. Gulf of Mexico activity continues to escalate. Internet website: http://www.workboat.com/blogpost.aspx?id=16938. Accessed December 5, 2012.

Gulf Coast Claims Facility. 2012. GCCF overall status report. Internet website: http://gulfcoastclaimsfacility.com/GCCF_Overall_Status_Report.pdf. Accessed April 24, 2012.

Habib, L.E., M. Bayne, and S. Boutin. 2007. Chronic industrial noise affects pairing success and age structure of ovenbirds *Seiurus aurocapilla*. Journal of Animal Ecology 44:176-184.

Haney, J.L., Y. Wei, T. Myers, and S. Douglas. 2008 (unpublished). An assessment of onshore air quality impacts for the eastern Gulf Coast (Louisiana to Florida) using the 2005 Gulfwide emissions inventory. Prepared for the U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA.

Harvey, J.T. and M.E. Dahlheim. 1994. Cetaceans in oil. In: Loughlin, T.R., ed. Marine mammals and the *Exxon Valdez*. San Diego, CA: Academic Press. Pp. 257-264.

Hayworth, J. 2012. Official communication. Email confirming telephone conversation regarding matching of tarballs observed on Alabama beaches to *Deepwater Horizon* oil. Auburn University, Harbert Engineering Center, Auburn, AL.

HDR. 2011. The cultural resources response to the MC 252 incident along the Gulf Coasts of Louisiana, Mississippi, Alabama, and Florida: Interim report, April 2010-March 2011. Prepared for BP Gulf Coast Restoration Organization, Metairie, LA.

Henkel, J.R., B.J. Sigel, and C.M. Taylor. 2012. Large-scale impacts of the *Deepwater Horizon* oil spill: Can local disturbance affect distant ecosystems through migratory shorebirds? BioScience 62:676-685.

Hockin, D., M. Ounsted, M. Gorman, D. Hill, V. Keller, and M.A. Barker. 1992. Examination of the effects of disturbance on birds with reference to its importance in ecological assessments. Journal of Environmental Management 36:253-286.

Hunter, W.C., J. Collazo, B. Noffsinger, B. Winn, D. Allen, B. Harrington, M. Epstein, and J. Saliva. 2002. Southeatern coastal plains-Carribean region report: U.S. shorebird conservation plan. U.S. Dept. of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Atlanta, GA. 46 pp. Internet website: http://www.fws.gov/shorebirdplan/regionalshorebird/downloads/SECPCRRev02.pdf. Accessed April 22, 2011.

Hunter, W.C., W. Golder, S. Melvin, and J. Wheeler. 2006. Southeast United States regional waterbird conservation plan. U.S. Dept. of the Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Atlanta, GA. 134 pp. Internet website: http://www.pwrc.usgs.gov/nacwcp/pdfs/regional/seusplanfinal906.pdf. Accessed January 20, 2011.

IHS.com. 2012. Day rate index. Internet website: http://www.ihs.com/products/oil-gas-information/drilling-data/day-rate-index.aspx?pu=1&rd=ods-petrodata_com. Accessed December 5, 2012.

Jackson, J.B.C., J.D. Cubit, B.D. Keller, V. Batista, K. Burns, H.M. Caffey, R.L. Caldwell, S.D. Garrity, C.D. Getter, C. Gonzalez, H.M. Guzman, K.W. Kaufmann, A.H. Knap, S.C. Levings, M.J. Marshall, R. Steger, R.C. Thompson, and E. Weil. 1989. Ecological effects of a major oil spill on Panamanian coastal marine communities. Science 243:37-44.

Jackson, L.E., J.C. Kurtz, and W.S. Fisher. 2000. Evaluation guidelines for ecological indicators. U.S. Environmental Protection Agency, Research Triangle Park, NC. EPA/620/R-99/005. 109 pp. Internet website: http://www.epa.gov/emap/html/pubs/docs/resdocs/ecol_ind.pdf.

Ji, Z.-G., W.R. Johnson, Z. Li, R.E. Green, S.E. O'Reilly, and M.P. Gravois. 2012. Oil spill risk analysis: Gulf of Mexico Outer Continental Shelf (OCS) lease sales, Central and Western Planning Areas, 2012-2017, and Gulfwide OCS Program, 2012-2051. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation, and Enforcement, Environmental Division, Herndon, VA. OCS Report BOEM 2012-066. 77 pp. Internet website: http://www.boem.gov/uploadedFiles/BOEM/Environmental_Stewardship/Environmental_Assessment/Oil_Spill_Modeling/2012-066-BOEM-OCS-Report.pdf.

Johnson, C.J. and M.-H. St-Laurent. 2011. Unifying framework for understanding impacts of human developments on wildlife. In: Naugle, D.E., ed. Energy development and wildlife conservation in western North America. Washington, DC: Island Press. Pp. 27-54.

Johnston, J.B., D.R. Cahoon, and M.K. La Peyre. 2009. Outer continental shelf (OCS)-related pipelines and navigation canals in the Western and Central Gulf of Mexico: Relative impacts on wetland habitats and effectiveness of mitigation. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2009-048. 200 pp.

Jones, J.B. 1992. Environmental impact of trawling on the seabed: A review. New Zealand Journal of Marine and Freshwater Research 26:59-67, 0028-8330/2601-0059. Internet website: http://www.eurocbc.org/envimpact_trawlseabed_review.pdf.

Kennicutt II, M.C., P.N. Boothe, T.L. Wade, S.T. Sweet, R. Rezak, F.J. Kelly, J.M. Brooks, B.J. Presley, and D.A. Wiesenburg. 1996. Geochemical patterns in sediments near offshore production platforms. Canadian Journal of Fisheries and Aquatic Science 53:2554-2566.

King, B.S. and J.D. Gibbons. 2011. Health hazard evaluation of *Deepwater Horizon* response workers. Health hazard evaluation report HETA 2010-0115 & 2010-0129-3138. National Institute for Occupational Safety and Health (NIOSH). August 2011. Internet website: http://www.cdc.gov/niosh/hhe/reports/pdfs/2010-0115-0129-3138.pdf. Accessed March 12, 2012.

Klimasinska, K. 2012. Deepwater permits in the U.S. Gulf exceed pre-BP spill level. Internet website: http://www.bloomberg.com/news/2012-10-17/deepwater-permits-in-u-s-gulf-exceed-pre-bp-spill-level.html. Posted October 16, 2012. Accessed December 5, 2012.

LGL Ecological Research Associates, Inc. and Science Applications International Corporation. 1998. Cumulative ecological significance of oil and gas structures in the Gulf of Mexico: Information search, synthesis, and ecological modeling; Phase I, final report. U.S. Dept. of the Interior, Geological Survey, Biological Resources Division, USGS/BRD/CR-1997-0006 and Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA, OCS Study MMS 97-0036. 130 pp.

Lincoln, F.C., S.R. Peterson, and J.L. Zimmerman. 1998. Migration of birds. U.S. Dept. of the Interior, Fish and Wildlife Service, Washington, DC. Circular 16. 119 pp. Internet website: http://library.fws.gov/Circulars/Mig_of_Birds_16_98.pdf.

Long, P.H., R.A. Herbert, J.C. Peckham, S.L. Grumbein, C.C. Shackelford, and K. Abdo. 2003. Morphology of nasal lesions in F344/N rats following chronic inhalation exposure to naphthalene vapors. Toxicologic Pathology 31:655-664.

Louisiana Department of Wildlife and Fisheries. 2012. News Release: LDWF closes a portion of coastal waters due to the emergence of oil on adjacent beaches. September 4, 2012. Internet website: http://www.wlf.louisiana.gov/news/35907. Accessed September 5, 2012.

Lubowski, R.N., M. Vesterby, S. Bucholtz, A. Baez, and M. Roberts. 2006. Major uses of land in the United States, 2002. U.S. Dept. of Agriculture, Economic Research Service. Economic Information Bulletin No. (EIB-14). 54 pp. Internet website: http://www.ers.usda.gov/publications/eib-economic-information-bulletin/eib14.aspx. Accessed January 16, 2013.

Mackar, R. 2012. GuLF STUDY makes final call for study participants. National Institute of Environmental Health Sciences. Environmental Factor, November 2012. Internet website: http://www.niehs.nih.gov/news/newsletter/2012/11/spotlight-gulf/index.htm. Accessed December 18, 2012.

Matkin, C.O., E.L. Saulitis, G.M. Ellis, P. Olesiuk, and S.D. Rice. 2008. Ongoing population-level impacts on killer whales *Orcinus orca* following the "Exxon Valdez" oil spill in Prince William Sound, Alaska. Marine Ecology Progress Series 356:269-281.

McConnaughey, J. 2012. Louisiana's 2nd dead zone could stretch past Ala. Associated Press. February 8, 2012. Internet website: http://www.gulfhypoxia.net/news/default.asp?XMLFilename=201202081436.xml. Accessed April 2, 2012.

Mendelssohn, I.A., G.L. Andersen, D.M. Baltz, R.H. Caffey, K.R. Carman, J.W. Fleeger, S.B. Joye, Q. Lin, E. Maltby, E.B. Overton, and L.P. Rozas. 2012. Oil impacts on coastal wetlands: Implications for the Mississippi River Delta ecosystem after the *Deepwater Horizon* oil spill. BioScience 62:562-574.

Middlebrook, A.M., D.M. Murphy, R. Ahmadov, E.L. Atlas, R. Bahreini, D.R. Blake, J. Frioud, J.A. deGouw, F.C. Fehsenfeld, G.J. Frost, J.S. Holloway, D.A. Lack, J.M. Langridge, R.A. Lueb, S.A. McKeen, J.F. Meagher, S. Meinardi, J.A. Neuman, J.G.Nowak, D.D. Parrish, J. Peischl, A.E. Perring, I.B. Pollack, J.M. Roberts, T.B. Ryerson, J.P. Schwarz, J.R. Spackman, C. Warneke, and A.R. Ravishankara. 2011. Air quality implications of the *Deepwater Horizon* oil spill. Proceedings of the National Academy of Science. Early edition, December 2011. Internet website: http://www.pnas.org/content/early/2011/12/23/1110052108.full.pdf. Accessed March 14, 2012.

Montagna, P.A. and D.E. Harper, Jr. 1996. Benthic infaunal long-term response to offshore production platforms in the Gulf of Mexico. Canadian Journal of Fisheries and Aquatic Science 53:2567-2588.

Montevecchi, W.A. 2006. Influences of artificial light on marine birds. In: Rich, C. and T. Longcore, eds. Ecological consequences of ecological night lighting. Washington, DC: Island Press. Pp. 94-11.

Moore, S.F. and R.L. Dwyer. 1974. Effects of oil on marine organisms: A critical assessment of published data. Water Research 8:819-827.

Muhling, B.A.,.M.A. Roffer, J.T. Lamkin, G.W. Ingram, Jr., M.A. Upton, G. Gawlikowski, F. Muller-Karger, S. Habtes, and W.J. Richards. 2012. Overlap between Atlantic bluefin tuna spawning grounds and observed *Deepwater Horizon* surface oil in the northern Gulf of Mexico. Marine Pollution Bulletin 64(4):679-687, doi:10.1016/j.marpolbul.2012.01.034.

National Institute of Environmental Health Sciences. 2012. GuLF STUDY marks recruitment milestone. Internet website: http://www.niehs.nih.gov/news/newsletter/2012/4/spotlight-gulfstudy/index.htm. Accessed January 9, 2013.

National Institutes of Health. 2013. Gulf long-term follow-up study for oil spill clean-up workers and volunteers. Internet website: https://gulfstudy.nih.gov/en/index.html. Accessed February 20, 2013.

National Research Council (NRC). 1983. Drilling discharges in the marine environment. Panel on Assessment of Fates and Effects of Drilling Fluids and Cuttings in the Marine Environment. Marine Board, Commission on Engineering and Technical Systems, National Research Council. Washington, DC: National Academy Press. Pp. 18-21.

National Research Council (NRC). 2003. Oil in the sea III: Inputs, fates, and effects (Committee on Oil in the Sea: J.N. Coleman, J. Baker, C. Cooper, M. Fingas, G. Hunt, K. Kvenvolden, J. McDowell, J. Michel, K. Michel, J. Phinney, N. Rabalais, L. Roesner, and R.B. Spies). Washington, DC:

National Academy Press. 265 pp. Internet website: http://www.nap.edu/catalog.php?record_id-10388. Accessed January 8, 2011.

Neal Adams Firefighters Inc. 1991. Joint industry program for floating vessel blowout control. Prepared for the U.S. Dept. of the Interior, Minerals Management Service. TA&R Project 150. Internet website: http://www.bsee.gov/Research-and-Training/Technology-Assessment-and-Research/Project-150.aspx.

Neff, J.M. 2005. Composition, environmental fates, and biological effects of water based drilling muds and cuttings discharged to the marine environment: A synthesis and annotated bibliography. Prepared for the Petroleum Environmental Research Forum and American Petroleum Institute. Duxbury, MA: Battelle. 83 pp. Internet website: http://www.perf.org/pdf/APIPERFreport.pdf.

Newman, J.R. 1979. Effects of industrial air pollution on wildlife. Biological Conservation 15:181-190.

Newman, J.R. and R.K. Schreiber. 1988. Air pollution and wildlife toxicology: an overlooked problem. Environmental Toxicology and Chemistry 7:381-390.

Newton, I. 1998. Population limitation in birds. San Diego, CA: Academic Press. 597 pp.

North American Bird Conservation Initiative. 2010. The state of the birds: 2010 report on climate change—United States of America. U.S. Dept. of the Interior, Fish and Wildlife Service, Washington, DC. 32 pp. Internet website: http://www.stateofthebirds.org/2010/pdf_files/State%20of%20the%20Birds_FINAL.pdf. Accessed January 13, 2011.

Oil and Gas Journal. 2009. BP finds oil in multiple Lower Tertiary reservoirs. Internet website: http://www.ogfj.com/index/article-display/5015598529/articles/oil-gas-financial-journal/volume-6/Issue_10/Upstream_News/BP_finds_oil_in_multiple_Lower_Tertiary_reservoirs.html. Posted October 1, 2009. Accessed January 11, 2011.

Operational Science Advisory Team (OSAT). 2010. Summary report for sub-sea and sub-surface oil and dispersant detection: Sampling and monitoring. Unified Area Command, New Orleans, LA. Released December 17, 2010. Internet website: http://www.restorethegulf.gov/sites/default/files/documents/pdf/OSAT_Report_FINAL_17DEC.pdf. Accessed March 14, 2011.

Operational Science Advisory Team (OSAT-2). 2011. Summary report for fate and effects of remnant oil in the beach environment. Operational Science Team (OSAT-2), Gulf Coast Incident Management Team. Prepared for Lincoln H. Stroh, Capt., U.S. Coast Guard, Federal On-Scene Coordinator, *Deepwater Horizon* MC 252. February 10, 2011. 35 pp. Internet website: http://www.dep.state.fl.us/deepwaterhorizon/files2/osat_2_report__10feb.pdf.

Overton, E. 2012. Official communication. Email confirming telephone conversation regarding matching of tarballs observed on Louisiana beaches to *Deepwater Horizon* oil. Louisiana State University, School of the Coast and Environment, Baton Rouge, LA.

Palinkas, L.A., A.J. Russell, M.A. Downs, and J.S. Petterson. 1992. Ethnic-differences in stress, coping, and depressive symptoms after the *Exxon Valdez* oil-spill. Journal of Nervous and Mental Disease 180:287-295.

PCCI Marine and Environmental Engineering. 1999. Oil spill containment, remote sensing and tracking for deepwater blowouts: Status of existing and emerging technologies. Report prepared for the U.S. Dept. of the Interior, Minerals Management Service. TA&R Project 311. 66 pp. + apps. Internet website: http://www.bsee.gov/Research-and-Training/Technology-Assessment-and-Research/Project-311.aspx.

Perez, C., I. Munilla, M. Lopez-Alonso, and A. Velando. 2010. Sublethal effects on seabirds after the *Prestige* oil-spill are mirrored in sexual signals. Biological Letters 6:33-35.

Piatt, J.F. and R.G. Ford. 1996. How many seabirds were killed by the *Exxon Valdez* oil spill? American Fisheries Society Symposium 18:712-719.

Piatt, J.F., H.R. Carter, and D.N. Nettleship. 1990a. Effects of oil pollution in marine bird populations. In: White, J., ed. The effects of oil on wildlife: Research, rehabilitation and general concerns.

Proceedings of the Oil Symposium, Herndon, VA, October 16-18, 1990. Hanover, PA: Sheridan Press. Pp. 125-141.

Piatt, J.F., C.J. Lensink, W. Butler, M. Kendziorek, and D.R. Nysewander. 1990b. Immediate impact of the '*Exxon Valdez*' oil spill on seabirds. Auk 107:387-397.

Pierce, K.E., R.J. Harris, L.S. Larned, and M.A. Pokras. 2004. Obstruction and starvation associated with plastic ingestion in a northern gannet *Morus bassanus* and a greater shearwater *Puffinus gravis*. Marine Ornithology 32:187-189.

Powell, E.N. 1995. Evidence for temporal change at seeps. In: MacDonald, I.R., W.W. Schroeder, and J.M. Brooks, eds. Chemosynthetic ecosystems study: Final report. Volume 2: Technical report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 95-0022. Pp. 8.1-8.65.

Probert P.K., D.G. McKnight, and S.L. Grove. 1997. Benthic invertebrate bycatch from a deep-water trawl fishery, Chatham Rise, New Zealand. Aquatic Conservation: Marine and Freshwater Ecosystems 7:27-40. Internet website: http://www.mcbi.org/what/what_pdfs/Probert_et_al_1997.pdf.

Quest Offshore. 2011. United States Gulf of Mexico oil and natural gas industry economic impact analysis. Internet website: http://www.noia.org/website/staticdownload.asp?id=45798.

Rabalais, N.N., R.E. Turner, and D. Scavia. 2002a. Beyond science into policy: Gulf of Mexico hypoxia and the Mississippi River. BioScience 52:129-142.

Rabalais, N.N., R.E. Turner, and W.J. Wiseman, Jr. 2002b. Gulf of Mexico hypoxia, A.K.A. The Dead Zone. Annual Review of Ecological Systems 33:235-263.

Reddy, C.M. 2012. Official communication. Email discussing a clarification of the percent of PAH by weight reported in the contact's paper. Woods Hole, MA. April 4, 2012.

Reddy, C.M., J.S. Arey, J.S. Seewald, S.P. Sylva, K.L. Lemkau, R.K. Nelson, C.A. Carmichael, C.P. McIntyre, J. Fenwick, G.T. Ventura, B.A.S. Van Mooy, and R. Camilli. 2011. Composition and fate of gas and oil released to the water column during the *Deepwater Horizon* oil spill. Proceedings of the National Academy of Sciences (PNAS), 10.1073/pnas.1101242108.

Regg, J.B., S. Atkins, B. Hauser, J. Hennessey, B. Kruse, J. Lowenhaupt, B. Smith, and A. White. 2000. Deepwater development: A reference document for the deepwater environmental assessment, Gulf of Mexico OCS (1998 through 2007). U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Report MMS 2000-015. 94 pp.

RestoreTheGulf.gov. 2011. Fish and wildlife. Internet website: http://www.restorethegulf.gov/fish-wildlife. Accessed June 28, 2011.

Rezak, R., T.J. Bright, and D.W. McGrail. 1983. Reefs and banks of the northwestern Gulf of Mexico: Their geological, biological, and physical dynamics. Final Technical Report No. 83-1-T.

Rigzone. 2009. Offshore rig search. Internet website: http://www.rigzone.com. Accessed February 26, 2013.

Rigzone. 2012. Rig data: Worldwide offshore rig fleet information. Internet website: http://www.rigzone.com/data/. Accessed December 5, 2012.

Robards, M.D., J.F. Piatt, and K.D. Wohl. 1995. Increasing frequency of plastic particles ingested by seabirds in the subarctic North Pacific. Marine Ecology Progress Series 30:151-157.

Rotkin-Ellman, M. and G. Soloman. 2012. FDA risk assessment of seafood contamination after the BP oil spill: Rotkin-Ellman and Soloman respond. Environmental Health Perspectives 120(2), February 2012. Internet website: http://ehp03.niehs.nih.gov/article/fetchArticle.action;jsessionid=DC38892D6D62B962BC4A8C42BEBDA24A?articleURI=info%3Adoi%2F10.1289%2Fehp.1104539R. Accessed March 14, 2012.

Rotkin-Ellman, M., K.M. Navarro, and G.M. Solomon. 2010. Gulf oil spill air quality monitoring: Lessons learned to improve emergency response. Environmental Science & Technology 44(22):8365-8366.

Rotkin-Ellman, M., K. Wong, and G. Soloman. 2012. Seafood contamination after the BP Gulf oil spill and risks to vulnerable populations: A critique of the FDA risk assessment. Environmental Health Perspectives 120(2), February 2012. Internet website: http://ehp03.niehs.nih.gov/article/info%3Adoi%2F10.1289%2Fehp.1103695. Accessed March 14, 2012.

Russell, R.W. 2005. Interactions between migrating birds and offshore oil and gas platforms in the northern Gulf of Mexico: Final report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2005-009. 327 pp.

Ryerson T.B., R. Camilli, J.D. Kessler, E.B. Kujawinski, C.M. Reddy, D.L. Valentine, E. Atlas, D.R. Blake, J. de Gouw, S. Meinardi, D. Parrish, J. Peischl, J.S. Seewald, and C. Warneke. 2011. Chemical data quantify *Deepwater Horizon* hydrocarbon flow rate and environmental distribution. Proceedings of the National Academy of Sciences. Internet website: http://www.pnas.org/content/early/2012/01/04/1110564109.

Share the Beach. 2012. Nesting season statistics. Internet website: http://www.alabamaseaturtles.com/nesting-season-statistics/. Accessed August 27, 2012.

Shedd, W., P. Godfriaux, K. Kramer, and J. Hunt. 2011. Seismic water bottom anomalies. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, Office of Resource Evaluation, Regional Analysis Unit, New Orleans, LA. Internet website: http://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/Map-Gallery/Seismic-Water-Bottom-Anomalies-Map-Gallery.aspx. Accessed March 15, 2012.

Shigenaka, G. 2001. Toxicity of oil to reef-building corals: A spill response perspective. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, Seattle, WA. NOAA Technical Memorandum NOS OR&R 8. 95 pp. Internet website: http://archive.orr.noaa.gov/book_shelf/1_coral_tox.pdf.

Shinn, E.A., B.H. Lidz, and C.D. Reich. 1993. Habitat impacts of offshore drilling: Eastern Gulf of Mexico. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 93-0021. 73 pp.

Silliman, B.R., J. van de Koppel, M.W. McCoy, J. Diller, G.N. Kasozi, K. Earl, P.N. Adams, and A.R. Zimmerman. 2012. Degradation and resilience in Louisiana salt marshes after the BP—*Deepwater Horizon* oil spill. Proceedings of the National Academy of Sciences 109(28):11234-11239.

Smith, J.P., H.L. Mairs, M.G. Brandsma, R.P. Meek, and R.C. Ayers, Jr. 1994. Field validation of the Offshore Operators Committee (OCC) produced water discharge model. Presented at the Society of Petroleum Engineers 69th Annual Technical Conference and Exhibition, New Orleans, LA, September 25-28, 1994. SPE 28350.

Smith, S. 2005. Florida's population growth: Past, present and future. University of Florida, Bureau of Economic and Business Research, Gainesville, FL. 40 pp. Internet website: http://www.bebr.ufl.edu/files/FloridaPop2005_0.pdf.

State of Louisiana. Coastal Protection & Restoration. 2012. Natural Resource Damage Assessment. Internet website: http://coastal.louisiana.gov/index.cfm?md=pagebuilder&tmp=home&pid=157. Accessed April 4, 2012.

Stroud, R.H. 1992. Stemming the tide of coastal fish habitat loss. In: Proceedings of a Symposium on Coastal Fish Habitat, March 7-9, 1991, Baltimore, MD. National Coalition for Marine Conservation, Inc., Savannah, GA. Pp. 73-79.

Systems Applications International, Sonoma Technology, Inc., Earth Tech, Alpine Geophysics, and A.T. Kearney. 1995. Gulf of Mexico air quality study: Final report. Volumes I-III. U.S. Dept. of

the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 95-0038, 95-0039, and 95-0040. 650, 214, and 190 pp., respectively.

The Encyclopedia of Earth. 2008. Gulf of Mexico large marine ecosystem. Internet website: http://www.eoearth.org/article/Gulf_of_Mexico_large_marine_ecosystem?topic=49522. Updated December 28, 2010. Accessed January 11, 2011.

The Oil Drum. 2009. USA Gulf of Mexico oil production forecast update. Internet website: http://www.theoildrum.com/node/5081. Posted February 9, 2009. Accessed January 4, 2011.

Troy, D.M. 2011. Sasol to build the first gas-to-liquids plant in the US. Internet website: http://www.pennenergy.com/index/articles/pe-article-tools-template.articles.pennenergy.petroleum.refining.2011.09.sasol-to_build_the.html. Accessed April 25, 2012.

Trudel, K., S.L. Ross, R. Belore, G.B. Rainey, and S. Buffington. 2001. Technology assessment of the use of dispersants on spills from drilling and production facilities in the Gulf of Mexico outer continental shelf. In: Proceedings; Twenty-Third Arctic and Marine Oil Spill Conference, June 2001, Edmonton, Canada.

U.S. Dept. of Commerce. Census Bureau. 2012. Louisiana state and county quickfacts. Internet website: http://quickfacts.census.gov/qfd/states/22000.html. Accessed December 10, 2012.

U.S. Dept. of Commerce. National Aeronautics and Space Administration. 2003. SeaWiFS Project—detailed description. Internet website: http://oceancolor.gsfc.nasa.gov/SeaWiFS/BACKGROUND/SEAWIFS_970_BROCHURE.html. Updated July 30, 2003. Accessed January 11, 2011.

U.S. Dept. of Commerce. National Marine Fisheries Service. 2012a. 2010-2012 cetacean unusual mortality event in northern Gulf of Mexico. Internet website: http://www.nmfs.noaa.gov/pr/health/mmume/cetacean_gulfofmexico2010.htm. Accessed August 27, 2012.

U.S. Dept. of Commerce. National Marine Fisheries Service. 2012b. NOAA declares 2011-2012 bottlenose dolphin unusual mortality event in Texas. Internet website: http://www.nmfs.noaa.gov/pr/health/mmume/bottlenosedolphins_texas.htm. Accessed August 27, 2012.

U.S. Dept. of Commerce. National Marine Fisheries Service. 2012c. Sea turtle strandings in the Gulf of Mexico. Internet website: http://www.nmfs.noaa.gov/pr/species/turtles/gulfofmexico.htm. Accessed April 30, 2012.

U.S. Dept. of Commerce. National Marine Fisheries Service. 2012d. Commercial fishery landings. Internet website: http://www.st.nmfs.noaa.gov/st1/commercial/. Accessed September 21, 2012.

U.S. Dept. of Commerce. National Marine Fisheries Service. 2012e. Status of stocks: 2011 report on the status of U.S. fisheries. Annual report to Congress on the status of U.S. fisheries. 21 pp. Internet website: http://www.nmfs.noaa.gov/stories/2011/07/docs/report.pdf. Accessed September 21, 2012.

U.S. Dept. of Commerce. National Marine Fisheries Service. 2012f. Forecast for the 2012 Gulf Atlantic menhaden purse-seine fisheries and review of the 2011 fishing season, March 2012. Internet website: http://www.st.nmfs.noaa.gov/st1/market_news/menhaden_forecast_2012.pdf.

U.S. Dept. of Commerce. National Marine Fisheries Service. 2012g. Recreational fishing online database. Internet website: http://www.st.nmfs.noaa.gov/st1/recreational/queries/index.html. Accessed April 24, 2012.

U.S. Dept. of Commerce. National Oceanic and Atmospheric Administration. 2011a. The Gulf of Mexico at a glance: The second glance. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Ocean Service, Washington, DC. Internet website: http://stateofthecoast.noaa.gov/NOAAs_Gulf_of_Mexico_at_a_Glance_report.pdf. Accessed June 1, 2011.

U.S. Dept. of Commerce. National Oceanic and Atmospheric Administration. 2011b. Shoreline Clean-up and Assessment Technique (SCAT) shoreline oiling. Louisiana, March 7, 2011, SCAT oiling ground observations.

U.S. Dept. of Commerce. National Oceanic and Atmospheric Administration. 2011c. Shoreline Clean-up and Assessment Technique (SCAT) shoreline oiling. Mobile Sector, March 7, 2011, SCAT oiling ground observations.

U.S. Dept. of Commerce. National Oceanic and Atmospheric Administration. 2012a. Corals that are candidates for listing under the ESA. U.S. Dept. of Commerce, NOAA Fisheries, Office of Protected Resources. Internet website: http://www.nmfs.noaa.gov/pr/species/invertebrates/corals.htm. Accessed December 7, 2012.

U.S. Dept. of Commerce. National Oceanic and Atmospheric Administration. 2012b. NOAA scientists: Midwest drought brings fourth smallest Gulf of Mexico 'Dead Zone' since 1985. July 27, 2012. Internet website: http://www.gulfhypoxia.net/News/default.asp?XMLFilename=201207301325.xml. Accessed September 26, 2012.

U.S. Dept. of Commerce. National Oceanic and Atmospheric Administration. National Hurricane Center. 2012. Archive of Atlantic hurricane seasons, 1995-2011. Internet website: http://www.nhc.noaa.gov/2011atlan.shtml.

U.S. Dept. of Energy. Energy Information Administration. 2012a. Oil and crude petroleum products explained; use of oil. Internet website: http://www.eia.gov/energyexplained/index.cfm?page=oil_use. Accessed November 15, 2012.

U.S. Dept. of Energy. Energy Information Administration. 2012b. Total consumption of petroleum and other liquids by sector, 1990-2035 (million barrels per day). Internet website: http://www.eia.gov/forecasts/aeo/excel/fig110_data.xls. Accessed November 15, 2012.

U.S. Dept. of Energy. Energy Information Administration. 2012c. Oil: Crude and petroleum products explained; oil imports and exports. Internet website: http://www.eia.gov/energyexplained/index.cfm?page=oil_imports. Accessed November 15, 2012.

U.S. Dept. of Homeland Security. Coast Guard. 2012. Ballast water management. Internet website: http://www.uscg.mil/hq/cg5/cg522/cg5224/bwm.asp. Accessed May 3, 2012.

U.S. Dept. of Labor. Bureau of Labor Statistics. 2012. Quarterly census of employment and wages for 2008-2011. Internet website: http://www.bls.gov/cew. Accessed August 1, 2, 6, and 10, 2012.

U.S. Dept. of Labor. Occupational Safety and Health Administration. 2010a. OSHA statement on 2-butoxyethanol & worker exposure. July 9, 2010. Internet website: https://www.osha.gov/oilspills/oilspill-statement.html. Accessed March 14, 2012.

U.S. Dept. of Labor. Occupational Safety and Health Administration. 2010b. General health and safety information for the Gulf oil spill. August 19, 2010. Internet website: https://www.osha.gov/oilspills/deepwater-oil-spill-factsheet-ppe.pdf. Accessed March 14, 2012.

U.S. Dept. of the Interior. 2010a. Increased safety measures for energy development on the outer continental shelf, May 27, 2010. U.S. Dept. of the Interior, Washington, DC. 44 pp. Internet website: http://www.doi.gov/deepwaterhorizon/loader.cfm?csModule=security/getfile&PageID=33598.

U.S. Dept. of the Interior. 2010b. Salazar divides MMS's three conflicting missions. Press Release, May 19, 2010. Internet website: http://www.doi.gov/news/pressreleases/Salazar-Divides-MMSs-Three-Conflicting-Missions.cfm. Accessed October 4, 2011.

U.S. Dept. of the Interior. Bureau of Ocean Energy Management. 2012a. Proposed final Outer Continental Shelf oil & gas leasing program: 2012-2017. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Herndon, VA. OCS EIS/EA BOEM 2012-030.

U.S. Dept. of the Interior. Bureau of Ocean Energy Management. 2012b. 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. 3 vols. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS EIS/EA BOEM 2012-019.

U.S. Dept. of the Interior. Bureau of Ocean Energy Management. 2012c. Outer Continental Shelf oil and gas leasing program: 2012-2017—final environmental impact statement. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Herndon, VA. OCS EIS/EA BOEM 2012-030.

U.S. Dept. of the Interior. Bureau of Ocean Energy Management. 2012d. Outer continental shelf lease sale statistics. Internet website: http://boem.gov/Oil-and-Gas-Energy-Program/Leasing/Regional-Leasing/Outer-Continental-Shelf-Lease-Sale-Statistics.aspx. Accessed January 9, 2013.

U.S. Dept. of the Interior. Bureau of Ocean Energy Management. 2012e. Economic analysis methodology for the Five-Year OCS Oil and Gas Leasing Program for 2012-2017. Internet website: http://boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Leasing/Five_Year_Program/2012-2017_Five_Year_Program/PFP%20EconMethodology.pdf.

U.S. Dept. of the Interior. Bureau of Safety and Environmental Enforcement. 2012a. OCS spill incidents 1996-2011. Internet website: http://www.bsee.gov/Inspection-and-Enforcement/Accidents-and-Incidents/Spills----Statistics-and-Summaries-1996-2011.aspx. Accessed September 25, 2012.

U.S. Dept. of the Interior. Bureau of Safety and Environmental Enforcement. 2012b. Loss of well control—statistics and summaries 2006-2012 ytd. Internet website: http://www.bsee.gov/Inspection-and-Enforcement/Accidents-and-Incidents/Loss-of-Well-Control----Statistics-and-Summaries-2006-2010.aspx. Accessed September 25, 2012.

U.S. Dept. of the Interior. Fish and Wildlife Service. 2010a. Dead bird recovery locations. U.S. Dept. of the Interior, Fish and Wildlife Service, Washington, DC. 1 p. Internet website: http://www.fws.gov/home/dhoilspill/pdfs/DeadDensity20101214.pdf.

U.S. Dept. of the Interior. Fish and Wildlife Service. 2010b. Live bird recovery locations. U.S. Dept. of the Interior, Fish and Wildlife Service, Washington, DC. 1 p. Internet website: http://www.fws.gov/home/dhoilspill/pdfs/LiveDensity20101214.pdf.

U.S. Dept. of the Interior. Fish and Wildlife Service. 2010c. Beach-nesting birds of the Gulf. U.S. Dept. of the Interior, Fish and Wildlife Service, Region 4, Division of Migratory Bird Management, Atlanta, GA. 1 p. Internet website: http://www.fws.gov/home/dhoilspill/pdfs/DHBirdsOfTheGulf.pdf. Accessed January 5, 2011.

U.S. Dept. of the Interior, Fish and Wildlife Service and U.S. Dept. of the Interior, Minerals Management Service. 2009. Memorandum of Understanding between the U.S. Minerals Management Service and U.S. Fish and Wildlife Service regarding implementation of Executive Order 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds." U.S. Dept. of the Interior, Washington, DC. 17 pp. Internet website: http://www.fws.gov/migratorybirds/Partnerships/MMS-FWS_MBTA_MOU_6-4-09.pdf. Accessed May 5, 2011.

U.S. Dept. of the Interior. Geological Survey. 2012a. National water summary on wetland resources. U.S. Geological Survey Water-Supply Paper 2425. Internet website: http://water.usgs.gov/nwsum/WSP2425/. Accessed January 11, 2013.

U.S. Dept. of the Interior. Geological Survey. 2012b. Coastal change hazards: Hurricanes and extreme storms; Hurricane Isaac—Pre- and post-storm photo comparisons—Chandeleur Islands, Louisiana and Dauphin Island, Alabama. Internet website: http://coastal.er.usgs.gov/hurricanes/isaac/photo-comparisons/index.php. Last updated September 7, 2012. Accessed September 11, 2012.

U.S. Dept. of the Interior. Geological Survey. 2012c. USGS flyover shows storm damage and marsh dieback. Internet website: http://www.usgs.gov/newsroom/article.asp?ID=3398. Last updated September 11, 2012. Accessed September 17, 2012.

U.S. Dept. of the Interior. Geological Survey. 2012d. Reconnaissance of contaminants in selected wastewater-treatment-plant effluent and stormwater runoff entering the Columbia River, Columbia River Basin, Washington and Oregon, 2008-2010. Scientific Investigations Report 2012-5068. Internet website: http://pubs.usgs.gov/sir/2012/5068/section4.html. Accessed February 4, 2013.

U.S. Dept. of the Interior. Minerals Management Service. 1999. Summary of procedures for determining bid adequacy at offshore oil and gas lease sales: Effective July 1999 with Sale 174.

U.S. Dept. of the Interior. Minerals Management Service. 2000. Gulf of Mexico deepwater operations and activities: Environmental assessment. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS EIS/EA MMS 2000-001. 264 pp.

U.S. Dept. of the Interior. Minerals Management Service. 2006. Deepwater Gulf of Mexico 2006: America's expanding frontier. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Report MMS 2006-022. 144 pp.

U.S. Dept. of the Interior. Minerals Management Service. 2007a. Gulf of Mexico OCS oil and gas scenario examination: Exploration and development activity. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Report MMS 2007-052. 14 pp.

U.S. Dept. of the Interior. Minerals Management Service. 2007b. Gulf of Mexico OCS oil and gas lease sales: 2007-2012; Western Planning Area Sales 204, 207, 210, 215, and 218; Central Planning Area Sales 205, 206, 208, 213, 216, and 222—final environmental impact statement. 2 vols. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS EIS/EA MMS 2007-018.

U.S. Dept. of Transportation. Bureau of Transportation Statistics. 2010. Gulf Coast ports surrounding the *Deepwater Horizon* oil spill. June 2010. Research and Innovative Technology Administration. Internet website: http://www.bts.gov/publications/bts_fact_sheets/2010_001/pdf/entire.pdf. Accessed August 31, 2010.

U.S. Environmental Protection Agency. 2010. Air monitoring on Gulf coastline (monitoring air quality along the Gulf Coast, 2011). Internet website: http://www.epa.gov/BPSpill/air.html. Accessed June 29, 2010.

U.S. Environmental Protection Agency. 2011. Overview of draft 2013 vessel general permit and small vessel general permit. EPA-800-F-11-002. Internet website: http://www.epa.gov/npdes/pubs/vgp_brieffactsheet2011.pdf. Accessed May 3, 2012.

Velando, A., I. Munilla, and P.M. Leyenda. 2005. Short-term indirect effects of the *Prestige* oil spill on European shags: Changes in availability of prey. Marine Ecology Progress Series 302:263-274.

Wannamaker, C.M. and J.A. Rice. 2000. Effects of hypoxia on movements and behavior of selected estuarine organisms from the southeastern United States. Journal of Experimental Marine Biology and Ecology 249:145-163.

Waring, G.T., E. Josephson, K. Maze-Foley, and P.E. Rosel, eds. 2011. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments—2010. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration. NOAA Technical Memorandum NMFS-NE-219. 598 pp. Internet website: http://www.nefsc.noaa.gov/publications/tm/tm219/.

Wheeler, N.M., S.B. Reid, K.J. Craig, J.R. Zielonka, D.R. Stauffer, and S.R. Hanna. 2008. Cumulative increment analysis for the Breton National Wilderness Area. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2008-058. 334 pp.

Whitehead, A., B. Dubansky, C. Bodinier, T.I. Garcia, S. Miles, C. Pilley, V. Raghunathan, J.L. Roach, N. Walker, R.B. Walter, C.D. Rice, and F. Galvez. 2011. Genomic and physiological footprint of the *Deepwater Horizon* oil spill on resident marsh fishes. Proceedings of the National Academy of Sciences 108(15):6193-6198.

Wiese, F.K., W.A. Montevecchi, G.K. Davoren, F. Huettmann, A.W. Diamond, and J. Linke. 2001. Seabirds at risk around offshore oil platforms in the north-west Atlantic. Marine Pollution Bulletin 42:1285-1290.

Wilhelm, S.I., G.J. Robertson, P.C. Ryan, and D.C. Schneider. 2007. Comparing an estimate of seabirds at risk to a mortality estimate from the November 2004 *Terra Nova* FPSO oil spill. Marine Pollution Bulletin 54:537-544.

Wilson, D., R. Billings, R. Oommen, B. Lange, J. Marik, S. McClutchey, and H. Perez. 2010. Year 2008: Gulfwide emission inventory study. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEMRE 2010-045. 186 pp.

Woods & Poole Economics, Inc. 2010. The 2011 complete economic and demographic data source (CEDDS) on CD-ROM.

Woods & Poole Economics, Inc. 2011. CEDDS 2012: The complete economic and demographic data source on CD-ROM.

Yarwood, G., G. Mansell, M. Jimenez, and S. Lau. 2004 (unpublished). 2000 Gulf-wide emissions inventory—OCS on-shore impacts modeling (Texas), a preliminary look. Prepared for the U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. Prepared by ENVIRON International Corporation, Novato, CA. September 1, 2004.

Zabala, J., I. Zuberogoitia, J.A. Martinez-Climent, and J. Etxezarreta. 2010. Do long lived seabirds reduce the negative effects of acute pollution on adult survival by skipping breeding? A study with European storm petrels (*Hydrobates pelagicus*) during the "Prestige" oil-spill. Marine Pollution Bulletin 62:109-115.

Zafonte, M. and S. Hampton. 2005. Lost bird-years: Quantifying bird injuries in natural resource damage assessments for oil spills. In: Proceedings of the 19th International Oil Spill Conference, Miami Beach, FL. American Petroleum Institute. Pp. 1-5. Internet website: http://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=22092&inline=true.

CHAPTER 7

PREPARERS

7. PREPARERS

Gary D. Goeke, Chief, Regional Assessment Section
Lissa Lyncker, Unit Supervisor, Environmental Scientist
Tershara Matthews, Unit Supervisor, Environmental Scientist

Casey J. Rowe, NEPA Coordinator, Senior Environmental Scientist
Kenneth A. Ashworth, NEPA Co-Coordinator, Environmental Scientist
Brian Cameron, NEPA Co-Coordinator, Environmental Scientist
Poojan Tripathi, Headquarters' Coordinator, Environmental Protection Specialist

Pat Adkins, Information Management Specialist
Bruce Baird, Biologist
Sindey Chaky, Environmental Protection Specialist
Deborah Epperson, Protected Species Biologist
Jeff S. Gleason, Biologist
Donald (Tre) W. Glenn III, Protected Species Biologist
Rebecca Green, Oceanographer
Chin Hua Huang, Meteorologist
Mark Jensen, Economist
Jack Irion, Unit Supervisor, Marine Archaeologist
Agatha-Marie Kaller, Unit Supervisor, Marine Biologist
Carla Langley, Geographer
Stacie Merritt, Physical Scientist
Margaret Metcalf, Unit Supervisor, Physical Scientist
Deborah H. Miller, Technical Editor
David P. Moran, Biologist
Maureen M. Mulino, Marine Biologist
Michelle Nannen, Marine Biologist
S. Erin O'Reilly, Physical Scientist
Catherine A. Rosa, Environmental Assessment Program Specialist
James Sinclair, Marine Biologist

FIGURES

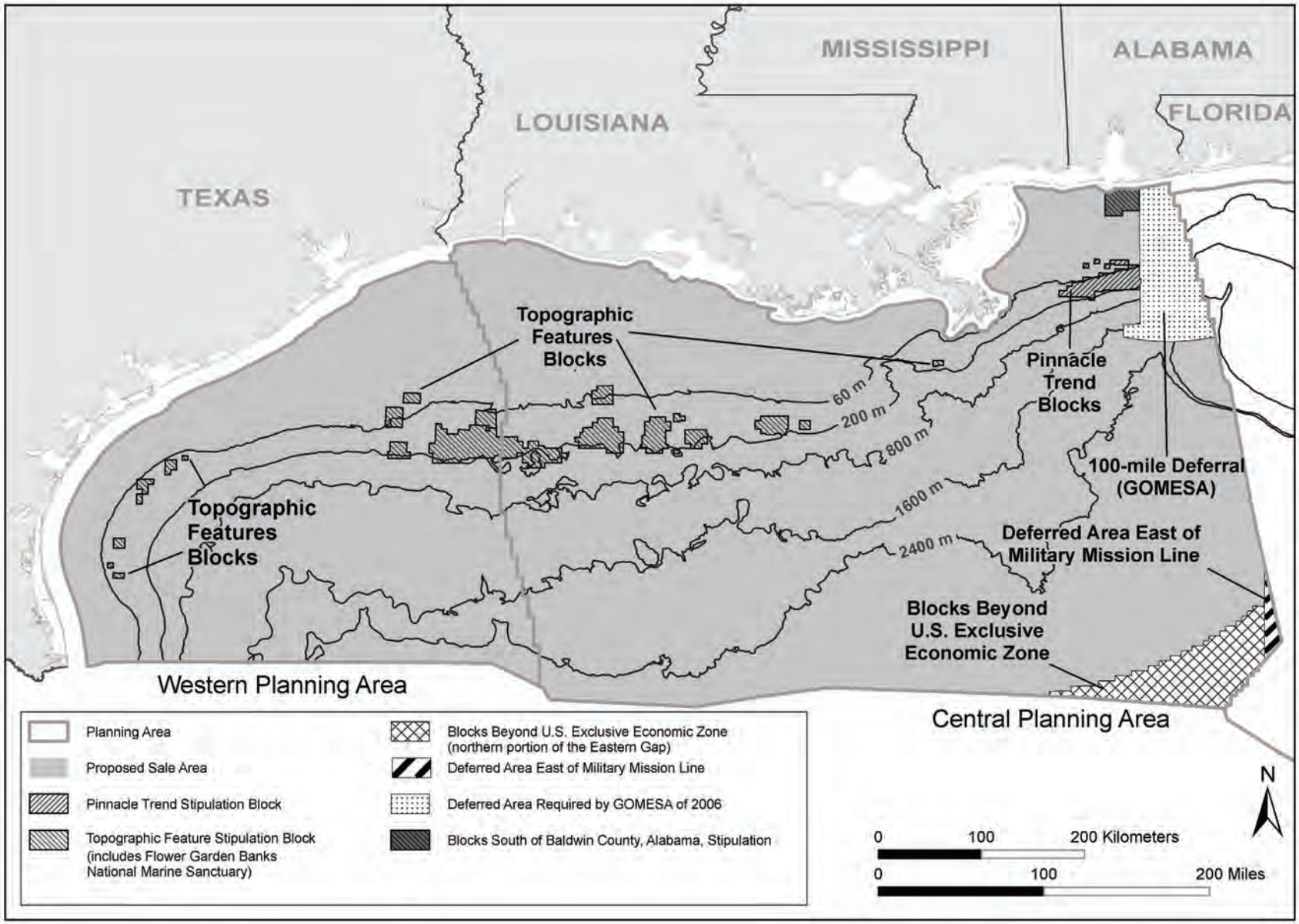


Figure 2-1. Location of Proposed Stipulations and Deferrals.

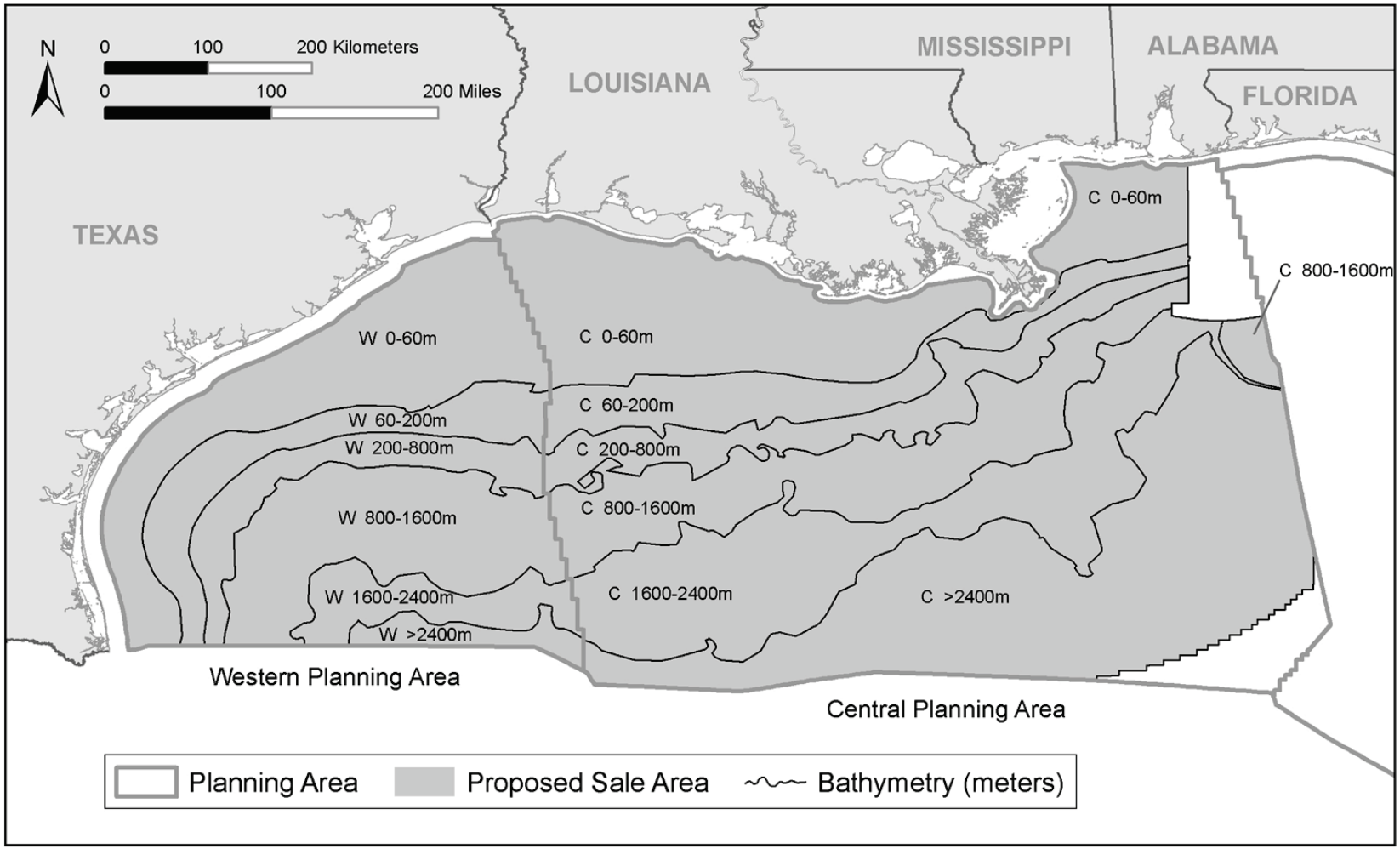


Figure 3-1. Offshore Subareas in the Gulf of Mexico.

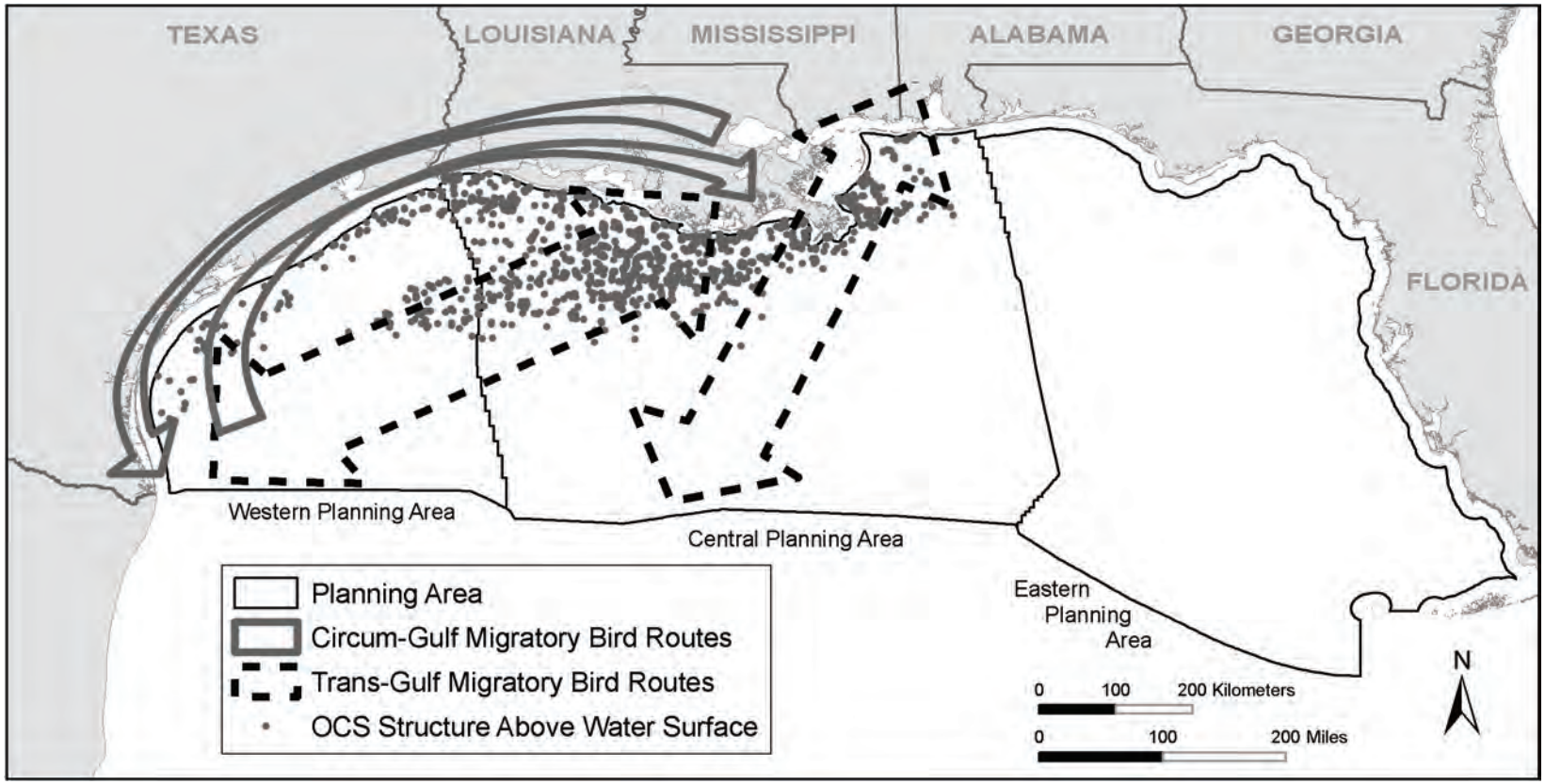


Figure 4-1. Relative Migratory Paths or Corridors for Trans-Gulf Migratory Birds in the Gulf of Mexico (Spring migration is indicated by northerly facing arrows; fall migration is indicated by south-southwest facing arrows. Trans-Gulf migrations are represented by dashed lines; circum-Gulf migrations are represented by gray unbroken arrows.) (adapted from Rappole and Ramos, 1994).

REFERENCES

Rappole, J.H. and M.A. Ramos. 1994. Factors affecting migratory bird routes over the Gulf of Mexico. Bird Conservation International 4:251-262, doi:10.1017/S095927090000280X. Internet website: http://si-pddr.si.edu/jspui/bitstream/10088/500/1/Rappole1994a.pdf.

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	0.0502

BBO = billion barrels of oil.
Tcf = trillion cubic feet.

Table 3-2

Offshore Scenario Information Related to a Typical Lease Sale in the Western Planning Area

	Offshore Subareas[1]						
	0-60 m	60-200 m	200-800 m	800-1,600 m	1,600-2,400 m	>2,400 m	Total WPA[2]
Wells Drilled							
Exploration and Delineation Wells	23-38	7-12	9-16	8-13	3-5	3-5	53-89
Development and Production Wells	30-49	11-17	13-21	11-18	6-8	6-8	77-121
Producing Oil Wells	4-6	2	8-13	7-11	3-4	3-4	27-40
Producing Gas Wells	22-37	7-12	3-5	2-4	1-2	1-2	36-62
Production Structures							
Installed	10-17	1-2	1	1	1	1	15-23
Removed Using Explosives	7-12	1	0	0	0	0	7-13
Total Removed	9-16	1-2	1	1	1	1	14-22
Method of Transportation[3]							
Percent Piped	>99%	>99%	>99%	>99%	83->99%		94->99%
Percent Barged	<1%	0%	0%	0%	0%		<1%
Percent Tankered[4]	0%	0%	0%	0%	0-17%		0-5%
Length of Installed Pipelines (km)[5]	71-182	NA	NA	NA	NA	NA	237-554
Service-Vessel Trips (1,000's round trips)	21-33	2-3	2-3	17	16-17	16-17	64-75
Helicopter Operations (1,000's operations)	194-448	19-54	19-24	19-24	19-24	19-24	290-605

[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 (5,249 ft).
[5] Projected length of pipelines does not include length in State waters.
NA = not available.

Table 3-3

Offshore Scenario Information Related to a Typical Lease Sale in the Central Planning Area

	Offshore Subareas[1]						
	0-60 m	60-200 m	200-800 m	800-1,600 m	1,600-2,400 m	>2,400 m	Total CPA[2]
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 (5,249 ft).
[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 Gulf of Mexico (WPA, CPA, and EPA) for 2012-2051

	Offshore Subareas[1]						
	0-60 m	60-200 m	200-800 m	800-1,600 m	1,600-2,400 m	>2,400 m	Total OCS[2]
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	1240-1,730	1130-1670	860-1,190	950-1,280	970-1,450	8,530-12,180
Producing Oil Wells	520-701	215-278	704-1030	574-783	663-873	620-915	3,296-4,605
Producing Gas Wells	2,510-3,629	885-1272	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 (5,249 ft).
[5] Projected length of pipelines does not include length in State waters.
NA = not available.

Table 3-5

Offshore Scenario Information Related to OCS Program Activities
in the Western Planning Area for 2012-2051

	Offshore Subareas[1]						
	0-60 m	60-200 m	200-800 m	800-1,600 m	1,600-2,400 m	>2,400 m	Total WPA[2]
Wells Drilled							
Exploration and Delineation Wells	500-740	170-230	220-320	160-230	70-90	60-80	1,180-1,690
Development and Production Wells	620-920	220-290	270-400	190-290	80-120	70-100	1,450-2,120
Producing Oil Wells	74-109	27-38	170-255	125-191	54-77	45-67	495-737
Producing Gas Wells	476-711	163-222	70-105	45-69	16-23	15-23	785-1,153
Production Structures							
Installed	220-330	20-30	6-10	5-8	2-3	2-3	255-384
Removed Using Explosives	146-219	14-21	1	0	0	0	160-240
Total Removed	200-300	20-30	6-8	4-7	2-3	1-2	233-350
Method of Transportation[3]							
Percent Piped	>99%	>99%	>99%	>99%	50->99%		84->99%
Percent Barged	<1%	0%	0%	0%	0%		<1%
Percent Tankered[4]	0%	0%	0%	0%	0-50%		0-15%
Length of Installed Pipelines (km)[5]	1,967-4,128	NA	NA	NA	NA	NA	5,224-12,339
Service-Vessel Trips (1,000's round trips)	249-372	35-50	26-36	95-150	38-57	38-56	481-720
Helicopter Operations (1,000's operations)	4,489-8,987	418-836	125-272	104-209	42-84	42-84	5,220-10,450

[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 (5,249 ft).
[5] Projected length of pipelines does not include length in State waters.
NA = not available.

Table 3-6

Offshore Scenario Information Related to OCS Program Activities
in the Central Planning Area for 2012-2051

	Offshore Subareas[1]						
	0-60 m	60-200 m	200-800 m	800-1,600 m	1,600-2,400 m	>2,400 m	Total CPA[2]
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 (5,249 ft).
[5] Projected length of pipelines does not include length in State waters.
NA = not available.

Table 3-7

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 mg/L)	Negligible
Acute Toxicity	High due to monoaromatic hydrocarbons (BTEX)	Moderate due to diaromatic hydrocarbons (naphthalenes – 2 ring PAH's)	Low, except due to smothering (i.e., heavier oils may sink)
Chronic Toxicity	None, does not persist due to evaporation	PAH components components (e.g., naphthalenes – 2 ring PAH's)	PAH components (e.g., phenanthrene, anthracene – 3 ring PAH's)
Bioaccumulation Potential	None, does not persist due to 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 due to 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, toluene, ethylbenzene, and xylene
mg/L = milligram per liter
PAH = polycyclic aromatic hydrocarbons

Sources: Michel, 1992; Canadian Center for Energy Information, 2010.

Table 4-1

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	Endangered	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
Mountain Plover	Threatened	NA; proposed threatened	Near threatened	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	Candidate	NA – Priority 3	Least concern	FL, LA, TX	WPA, CPA, EPA

[1] Information contained in this table was obtained via an email attachment sent from the U.S. Fish and Wildlife Service (FWS) on April 6, 2012 (USDOI, FWS, 2012a), and from FWS's endangered species webpage and associated queries for "species" available from FWS's website (USDOI, FWS, 2012b). Additional information for each species can be found at . 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, 2005; Harris et al., 2012). If species meet quantitative thresholds of any of these 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 least tern was listed as endangered on May 28, 1985 (50 FR 21784 21792) 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 the 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.

Table 4-2

Birds Collected and Summarized by the U.S. Fish and Wildlife Service: Post-*Deepwater Horizon* Explosion, Oil Spill, and Cleanup 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**
Br.-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
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

Table 4-2. Birds Collected and Summarized by the U.S. Fish and Wildlife Service: Post-*Deepwater Horizon* Explosion, Oil Spill, and Cleanup 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	
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
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

Table 4-2. Birds Collected and Summarized by the U.S. Fish and Wildlife Service: Post-*Deepwater Horizon* Explosion, Oil Spill, and Cleanup 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	
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
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
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

Table 4-2. Birds Collected and Summarized by the U.S. Fish and Wildlife Service: Post-*Deepwater Horizon* Explosion, Oil Spill, and Cleanup 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	
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
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

Table 4-2. Birds Collected and Summarized by the U.S. Fish and Wildlife Service: Post-*Deepwater Horizon* Explosion, Oil Spill, and Cleanup in the Gulf of Mexico[1, 2] (continued).

[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, 2011). 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, 2011). 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, 2011).

[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, 2011). 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 (refer to 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. Overall oiling rate across species including "others" and "unknowns" was 0.24 versus 0.25 for individuals identified to species. 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, 2010) and the May 12, 2011, Collection Report (USDOI, FWS, 2011). 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, 2010).

[3] Species Group: As noted in Chapters 4.1.1.14 and 4.2.1.16 of the 2012-2017 WPA/CPA Multisale EIS.

[4] Oiling Rate: For each species, an oiling rate was calculated by dividing the "total" number of oiled individuals ($\sum$ alive + dead)/$\sum$ 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; Castege 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 Weise 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 Natural Resource Damage Assessment (NRDA) process has been completed, which

Table 4-2. Birds Collected and Summarized by the U.S. Fish and Wildlife Service: Post-*Deepwater Horizon* Explosion, Oil Spill, and Cleanup in the Gulf of Mexico[1, 2] (continued).

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 for 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 4-3

Angler Effort in 2009, 2010, and 2011

2009														
		Season A					Season B				Annual Total		
Area		Private	Charter	Total		Area	Private	Charter	Total		Private	Charter	Total
Bay		291,400	33,256	324,655		Bay	573,978	82,242	656,220		865,377	115,498	980,875
TTS		3,804	431	4,235		TTS	29,060	2,394	31,454		32,864	2,825	35,689
EEZ		252	0	252		EEZ	20,874	3,336	24,211		21,127	3,336	24,463
Total		295,456	33,687	329,143		Total	623,912	87,972	711,885		919,368	121,659	1,041,027
2010														
		Season A					Season B				Annual Total		
Area		Private	Charter	Total		Area	Private	Charter	Total		Private	Charter	Total
Bay		255,995	23,570	279,565		Bay	567,522	93,650	661,171		823,517	117,220	940,737
TTS		3,250	2,187	5,437		TTS	22,837	2,052	24,888		26,087	4,239	30,326
EEZ		744	0	744		EEZ	14,129	1,602	15,731		14,873	1,602	16,475
Total		259,989	25,758	285,747		Total	604,487	97,303	701,791		864,476	123,061	987,537
2011														
		Season A					Season B				Annual Total		
Area		Private	Charter	Total		Area	Private	Charter	Total		Private	Charter	Total
Bay		330,461	29,842	360,303		Bay	576,735	122,855	699,590		907,196	152,697	1,059,893
TTS		14,830	4,779	19,609		TTS	24,372	2,988	27,360		39,202	7,767	46,969
EEZ		1,424	850	2,274		EEZ	15,138	1,126	16,264		16,562	1,976	18,538
Total		346,715	35,471	382,186		Total	616,245	126,969	743,214		962,960	162,440	1,125,400

Notes: Season A is November 21 - May 14 and Season B is May 15 - November 20.
EEZ = Exclusive Economic Zone.
TTS = Texas (Territorial) State Waters.

Source: Fisher, official communication, 2012.

Table 4-4

Top Species Landed by Recreational Fishermen

Panel A: Total Landings					Panel B: Landings in Bays				
Species	2008	2009	2010	2011	Species	2008	2009	2010	2011
Atlantic Croaker	64	117	124	156	Atlantic Croaker	64	117	124	154
Black Drum	82	98	165	129	Black Drum	80	97	164	127
King Mackerel	8	16	6	9	King Mackerel	--	--	--	--
Red Drum	267	285	264	347	Red Drum	262	277	261	344
Red Snapper	39	31	33	36	Red Snapper	--	--	--	--
Sand Seatrout	152	111	127	226	Sand Seatrout	137	108	126	220
Sheepshead	46	34	49	57	Sheepshead	46	34	49	57
Southern Flounder	64	47	30	92	Southern Flounder	64	47	30	92
Spotted Seatrout	920	810	732	1,137	Spotted Seatrout	895	789	721	1,119
Panel C: Landings in State Waters					Panel D: Landings in EEZ				
Species	2008	2009	2010	2011	Species	2008	2009	2010	2011
Atlantic Croaker	--	--	--	2	Atlantic Croaker	--	--	--	--
Black Drum	2	1	--	2	Black Drum	--	--	1	--
King Mackerel	5	7	5	5	King Mackerel	4	9	1	4
Red Drum	4	8	--	3	Red Drum	0	1	3	--
Red Snapper	28	13	12	22	Red Snapper	13	19	21	14
Sand Seatrout	13	2	1	5	Sand Seatrout	1	1	1	1
Sheepshead	--	--	--	--	Sheepshead	--	--	--	--
Southern Flounder	--	--	--	--	Southern Flounder	--	--	--	--
Spotted Seatrout	18	14	--	18	Spotted Seatrout	5	8	10	--

Notes: Fish landings are measured in thousands of fish.
EEZ = Exclusive Economic Zone.

Source: Fisher, official communication, 2012.

Table 4-5

Recreational Employment: Employment in the Leisure/Hospitality Industry
in Selected Geographic Regions

Region	2008	2009	2010	2011
Panel A: Economic Impact Area				
TX-1	55,069	54,548	55,589	57,624
TX-2	16,883	16,718	16,934	18,190
TX-3	240,231	240,425	244,821	252,952
LA-1	14,295	14,214	13,979	14,496
LA-2	21,364	20,675	20,618	21,312
LA-3	46,037	44,414	44,796	47,031
LA-4	68,605	68,161	72,757	75,588
MS-1	27,702	26,904	26,981	27,719
AL-1	26,516	25,872	26,925	27,340
FL-1	40,001	41,002	42,550	45,246
FL-2	22,502	21,689	22,111	22,462
FL-3	146,368	142,302	145,324	148,021
FL-4	283,359	279,839	289,247	303,345
TX EIA Total	312,183	311,691	317,344	328,766
LA EIA Total	150,301	147,464	152,150	158,427
MS EIA Total	27,702	26,904	26,981	27,719
AL EIA Total	26,516	25,872	26,925	27,340
FL EIA Total	492,230	484,832	499,232	519,074
EIA Total	1,008,932	996,763	1,022,632	1,061,326
Panel B: Coastal				
TX	67,605	68,594	69,099	71,821
LA	77,580	76,617	81,431	84,139
MS	25,575	25,055	25,186	25,791
AL	24,319	23,825	24,816	25,172
FL	445,164	440,590	454,585	473,758
Coastal Total	640,243	634,681	655,117	680,681
Panel C: Statewide				
TX	995,445	982,840	1,006,277	1,040,091
LA	194,905	190,589	194,387	201,599
MS	121,033	115,868	116,204	117,644
AL	168,413	165,953	165,230	166,909
FL	922,534	896,383	929,448	961,764
State Total	2,402,330	2,351,633	2,411,546	2,488,007

Notes:

(1) The economic impact areas (EIA's) are shown in Figure 4-20 of the 2012-2017 WPA/CPA Multisale EIS.
(2) The "Coastal" category refers to counties within EIA's that are directly along the coast of the U.S.
(3) The "Statewide" category refers to the number of employees within the borders of the entire state.
(4) The leisure/hospitality industry is defined according to the North American Industrial Classification System.
(5) The employment figure for any given year corresponds to the total number of employees in December of that year.

Source: U.S. Dept. of Labor, Bureau of Labor Statistics, 2012.

Table 4-6

Baseline Population Projections (in thousands) by Economic Impact Area

Calendar Year	TX-1	TX-2	TX-3	LA-1	LA-2	LA-3	LA-4	MS-1	AL-1	FL-1	FL-2	FL-3	FL-4	Total
2010	1,799.51	626.81	6,202.46	345.97	584.86	1,142.20	1,242.45	482.25	725.94	882.64	660.01	3,627.12	6,173.13	24,495.33
2011	1,832.65	635.42	6,318.61	349.09	591.72	1,152.19	1,248.17	484.98	731.91	894.95	667.83	3,688.14	6,255.79	24,851.43
2012	1,866.48	644.27	6,437.11	352.34	598.82	1,162.61	1,254.39	487.89	738.17	907.59	675.90	3,750.54	6,340.82	25,216.93
2013	1,900.59	653.22	6,556.53	355.65	606.02	1,173.21	1,260.81	490.88	744.54	920.37	684.08	3,813.50	6,426.81	25,586.21
2014	1,934.86	662.24	6,676.47	358.98	613.28	1,183.90	1,267.35	493.92	750.98	933.24	692.32	3,876.76	6,513.36	25,957.66
2015	1,969.24	671.29	6,796.74	362.34	620.58	1,194.65	1,273.97	496.99	757.47	946.15	700.61	3,940.23	6,600.26	26,330.52
2016	2,003.72	680.38	6,917.33	365.73	627.93	1,205.45	1,280.66	500.08	763.99	959.10	708.92	4,003.87	6,687.49	26,704.68
2017	2,038.47	689.56	7,038.82	369.15	635.36	1,216.41	1,287.53	503.24	770.62	972.19	717.34	4,068.05	6,775.61	27,082.36
2018	2,073.33	698.78	7,160.61	372.60	642.83	1,227.41	1,294.46	506.43	777.28	985.32	725.79	4,132.40	6,864.04	27,461.28
2019	2,108.26	708.03	7,282.65	376.06	650.33	1,238.45	1,301.43	509.64	783.98	998.49	734.26	4,196.90	6,952.71	27,841.18
2020	2,143.31	717.32	7,405.08	379.54	657.88	1,249.55	1,308.49	512.87	790.71	1,011.71	742.78	4,261.62	7,041.77	28,222.62
2021	2,177.37	726.41	7,523.94	382.97	665.31	1,260.48	1,315.52	516.08	797.37	1,024.64	751.15	4,324.64	7,128.94	28,594.80
2022	2,211.98	735.62	7,644.70	386.43	672.82	1,271.51	1,322.59	519.31	804.08	1,037.74	759.60	4,388.58	7,217.19	28,972.14
2023	2,247.13	744.95	7,767.41	389.92	680.41	1,282.63	1,329.69	522.57	810.84	1,051.00	768.15	4,453.47	7,306.53	29,354.71
2024	2,282.84	754.39	7,892.08	393.45	688.09	1,293.85	1,336.84	525.84	817.67	1,064.43	776.80	4,519.32	7,396.98	29,742.59
2025	2,319.13	763.95	8,018.76	397.01	695.86	1,305.17	1,344.02	529.13	824.55	1,078.03	785.55	4,586.14	7,488.55	30,135.85
2026	2,353.18	773.03	8,137.46	400.42	703.29	1,316.01	1,350.99	532.32	831.16	1,090.93	793.88	4,649.03	7,575.46	30,507.14
2027	2,387.73	782.22	8,257.91	403.87	710.80	1,326.93	1,357.99	535.52	837.83	1,103.98	802.31	4,712.78	7,663.36	30,883.21
2028	2,422.79	791.51	8,380.15	407.34	718.39	1,337.94	1,365.03	538.75	844.54	1,117.18	810.82	4,777.41	7,752.29	31,264.14
2029	2,458.36	800.91	8,504.20	410.84	726.06	1,349.05	1,372.10	541.99	851.32	1,130.54	819.43	4,842.92	7,842.26	31,649.98
2030	2,494.45	810.43	8,630.09	414.37	733.82	1,360.25	1,379.21	545.25	858.15	1,144.07	828.12	4,909.33	7,933.26	32,040.79
2031	2,528.35	819.45	8,748.17	417.75	741.21	1,370.93	1,386.05	548.38	864.68	1,156.87	836.39	4,971.85	8,019.51	32,409.59
2032	2,562.71	828.57	8,867.88	421.15	748.69	1,381.69	1,392.92	551.54	871.27	1,169.81	844.74	5,035.16	8,106.69	32,782.81
2033	2,597.53	837.79	8,989.21	424.58	756.24	1,392.54	1,399.83	554.71	877.90	1,182.90	853.18	5,099.28	8,194.83	33,160.51
2034	2,632.83	847.11	9,112.21	428.04	763.86	1,403.47	1,406.77	557.89	884.59	1,196.14	861.69	5,164.21	8,283.92	33,542.74
2035	2,668.61	856.54	9,236.90	431.53	771.56	1,414.49	1,413.75	561.10	891.32	1,209.52	870.30	5,229.98	8,373.98	33,929.57
2036	2,702.72	865.62	9,355.65	434.93	779.04	1,425.22	1,420.68	564.27	897.91	1,222.41	878.63	5,292.86	8,460.77	34,300.70
2037	2,737.27	874.80	9,475.93	438.36	786.59	1,436.04	1,427.64	567.45	904.55	1,235.43	887.04	5,356.49	8,548.47	34,676.05
2038	2,772.27	884.07	9,597.75	441.82	794.21	1,446.94	1,434.64	570.65	911.24	1,248.59	895.53	5,420.89	8,637.07	35,055.67
2039	2,807.71	893.45	9,721.14	445.30	801.91	1,457.92	1,441.67	573.88	917.97	1,261.89	904.10	5,486.07	8,726.60	35,439.59
2040	2,843.60	902.92	9,846.12	448.81	809.68	1,468.98	1,448.74	577.12	924.76	1,275.33	912.75	5,552.03	8,817.05	35,827.88

Table 4-6. Baseline Population Projections (in thousands) by Economic Impact Area (continued).

Calendar Year	TX-1	TX-2	TX-3	LA-1	LA-2	LA-3	LA-4	MS-1	AL-1	FL-1	FL-2	FL-3	FL-4	Total
2041	2,879.95	912.49	9,972.71	452.35	817.52	1,480.13	1,455.84	580.37	931.59	1,288.91	921.48	5,618.78	8,908.43	36,220.57
2042	2,916.76	922.17	10,100.92	455.92	825.45	1,491.37	1,462.98	583.65	938.48	1,302.64	930.30	5,686.34	9,000.77	36,617.74
2043	2,954.05	931.94	10,230.78	459.51	833.44	1,502.68	1,470.15	586.94	945.42	1,316.52	939.21	5,754.71	9,094.06	37,019.41
2044	2,991.81	941.83	10,362.31	463.13	841.52	1,514.09	1,477.36	590.26	952.41	1,330.54	948.19	5,823.89	9,188.32	37,425.66
2045	3,030.06	951.81	10,495.53	466.78	849.68	1,525.58	1,484.60	593.59	959.45	1,344.71	957.27	5,893.92	9,283.56	37,836.53
2046	3,068.80	961.90	10,630.46	470.46	857.91	1,537.16	1,491.87	596.94	966.54	1,359.04	966.43	5,964.78	9,379.78	38,252.07
2047	3,108.03	972.10	10,767.13	474.17	866.22	1,548.83	1,499.19	600.31	973.68	1,373.51	975.68	6,036.49	9,477.00	38,672.35
2048	3,147.76	982.41	10,905.56	477.91	874.62	1,560.58	1,506.54	603.70	980.88	1,388.14	985.02	6,109.07	9,575.23	39,097.41
2049	3,188.00	992.82	11,045.76	481.68	883.09	1,572.42	1,513.92	607.10	988.13	1,402.93	994.44	6,182.52	9,674.48	39,527.31
2050	3,228.75	1,003.35	11,187.77	485.48	891.65	1,584.36	1,521.34	610.53	995.44	1,417.87	1,003.96	6,256.85	9,774.75	39,962.11
2051	3,270.02	1,013.99	11,331.61	489.31	900.29	1,596.38	1,528.80	613.98	1,002.79	1,432.98	1,013.57	6,332.08	9,876.07	40,401.86
2052	3,311.83	1,024.74	11,477.29	493.16	909.02	1,608.50	1,536.29	617.44	1,010.21	1,448.24	1,023.27	6,408.21	9,978.43	40,846.63
2053	3,354.16	1,035.61	11,624.84	497.05	917.82	1,620.71	1,543.82	620.93	1,017.67	1,463.67	1,033.06	6,485.26	10,081.86	41,296.47
2054	3,397.04	1,046.59	11,774.30	500.97	926.72	1,633.01	1,551.39	624.43	1,025.20	1,479.26	1,042.95	6,563.23	10,186.36	41,751.43
2055	3,440.47	1,057.68	11,925.67	504.92	935.70	1,645.40	1,559.00	627.96	1,032.77	1,495.01	1,052.93	6,642.14	10,291.94	42,211.59

Notes: Actual Woods & Poole data for 2010 through 2020, 2025, 2030, 2035, and 2040.
Missing estimates through 2040 calculated using average annual growth rate for the 5-year period; projections after 2040 calculated using the average annual growth rate from 2035 to 2040.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-7

Baseline Employment Projections (in thousands) by Economic Impact Area

Calendar Year	TX-1	TX-2	TX-3	LA-1	LA-2	LA-3	LA-4	MS-1	AL-1	FL-1	FL-2	FL-3	FL-4
2010	799.36	303.96	3,604.75	178.79	326.06	667.39	739.02	247.21	369.87	475.97	317.69	1,836.01	3,306.18
2011	793.09	303.60	3,648.80	176.78	323.47	662.76	736.37	251.36	373.47	478.36	314.73	1,837.13	3,330.93
2012	806.49	307.79	3,709.48	178.85	328.23	671.33	741.28	253.67	378.59	484.81	318.31	1,865.09	3,382.52
2013	821.31	312.42	3,776.39	181.19	333.53	680.95	747.23	256.30	384.36	491.97	322.52	1,897.15	3,439.80
2014	836.42	317.11	3,844.28	183.55	338.91	690.70	753.21	258.98	390.18	499.21	326.77	1,929.67	3,497.84
2015	851.79	321.84	3,913.17	185.95	344.32	700.56	759.21	261.68	396.12	506.56	331.07	1,962.67	3,556.64
2016	867.44	326.63	3,983.09	188.39	349.80	710.53	765.25	264.40	402.12	513.99	335.44	1,996.15	3,616.23
2017	883.38	331.48	4,054.02	190.85	355.35	720.63	771.30	267.13	408.23	521.51	339.84	2,030.11	3,676.61
2018	899.59	336.38	4,126.01	193.34	360.94	730.84	777.39	269.90	414.43	529.13	344.33	2,064.57	3,737.78
2019	916.13	341.33	4,199.04	195.88	366.60	741.18	783.50	272.70	420.72	536.85	348.86	2,099.53	3,799.78
2020	932.96	346.34	4,273.13	198.43	372.32	751.62	789.65	275.53	427.11	544.67	353.43	2,134.99	3,862.56
2021	950.10	351.36	4,347.87	201.03	378.05	762.16	795.79	278.37	433.58	552.56	358.07	2,170.81	3,925.76
2022	967.55	356.45	4,423.91	203.66	383.86	772.84	801.98	281.25	440.16	560.55	362.78	2,207.23	3,990.00
2023	985.33	361.62	4,501.28	206.33	389.76	783.68	808.21	284.15	446.84	568.67	367.55	2,244.26	4,055.28
2024	1,003.43	366.86	4,580.00	209.03	395.76	794.66	814.50	287.09	453.62	576.90	372.38	2,281.91	4,121.64
2025	1,021.87	372.17	4,660.10	211.77	401.84	805.80	820.83	290.05	460.50	585.25	377.27	2,320.20	4,189.08
2026	1,040.67	377.46	4,740.42	214.54	407.88	816.99	827.15	293.04	467.49	593.65	382.23	2,358.71	4,256.53
2027	1,059.82	382.81	4,822.12	217.35	414.01	828.32	833.52	296.06	474.59	602.16	387.26	2,397.86	4,325.06
2028	1,079.32	388.25	4,905.23	220.20	420.22	839.82	839.94	299.12	481.80	610.80	392.36	2,437.66	4,394.70
2029	1,099.19	393.76	4,989.77	223.08	426.54	851.47	846.41	302.20	489.11	619.56	397.52	2,478.12	4,465.46
2030	1,119.42	399.35	5,075.77	226.00	432.94	863.29	852.92	305.32	496.54	628.44	402.75	2,519.25	4,537.36
2031	1,140.07	404.89	5,162.03	228.97	439.30	875.16	859.45	308.46	504.08	637.38	408.08	2,560.65	4,609.30
2032	1,161.11	410.51	5,249.75	231.97	445.75	887.20	866.02	311.64	511.74	646.44	413.47	2,602.72	4,682.39
2033	1,182.53	416.21	5,338.97	235.02	452.29	899.40	872.65	314.84	519.52	655.64	418.93	2,645.49	4,756.64
2034	1,204.35	421.99	5,429.70	238.10	458.93	911.77	879.33	318.09	527.42	664.96	424.47	2,688.96	4,832.06
2035	1,226.57	427.85	5,521.98	241.23	465.66	924.32	886.06	321.36	535.43	674.42	430.08	2,733.14	4,908.68
2036	1,249.29	433.65	5,614.56	244.40	472.35	936.93	892.82	324.67	543.59	683.92	435.80	2,777.64	4,985.38
2037	1,272.43	439.52	5,708.69	247.61	479.14	949.71	899.63	328.02	551.86	693.56	441.60	2,822.86	5,063.27
2038	1,296.00	445.48	5,804.41	250.86	486.02	962.67	906.50	331.40	560.27	703.34	447.48	2,868.82	5,142.39
2039	1,320.00	451.52	5,901.73	254.15	493.00	975.80	913.42	334.81	568.80	713.25	453.43	2,915.52	5,222.74
2040	1,344.45	457.64	6,000.68	257.49	500.08	989.11	920.39	338.26	577.46	723.31	459.46	2,962.99	5,304.35

Table 4-7. Baseline Employment Projections (in thousands) by Economic Impact Area (continued).

Calendar Year	TX-1	TX-2	TX-3	LA-1	LA-2	LA-3	LA-4	MS-1	AL-1	FL-1	FL-2	FL-3	FL-4
2041	1,369.35	463.84	6,101.29	260.87	507.26	1,002.61	927.41	341.75	586.25	733.50	465.58	3,011.23	5,387.23
2042	1,394.71	470.13	6,203.59	264.30	514.54	1,016.28	934.49	345.27	595.18	743.84	471.77	3,060.25	5,471.40
2043	1,420.54	476.50	6,307.60	267.77	521.93	1,030.15	941.62	348.83	604.24	754.32	478.05	3,110.07	5,556.89
2044	1,446.85	482.96	6,413.35	271.28	529.43	1,044.20	948.81	352.42	613.44	764.96	484.41	3,160.70	5,643.72
2045	1,473.65	489.50	6,520.88	274.85	537.03	1,058.45	956.05	356.05	622.78	775.74	490.86	3,212.16	5,731.91
2046	1,500.94	496.14	6,630.21	278.46	544.75	1,072.89	963.34	359.72	632.26	786.67	497.39	3,264.45	5,821.47
2047	1,528.74	502.86	6,741.38	282.11	552.57	1,087.53	970.70	363.43	641.89	797.76	504.01	3,317.60	5,912.43
2048	1,557.05	509.67	6,854.41	285.82	560.51	1,102.37	978.10	367.17	651.66	809.01	510.71	3,371.61	6,004.81
2049	1,585.89	516.58	6,969.33	289.57	568.55	1,117.40	985.57	370.95	661.59	820.41	517.51	3,426.50	6,098.64
2050	1,615.26	523.58	7,086.18	293.37	576.72	1,132.65	993.09	374.78	671.66	831.97	524.40	3,482.29	6,193.93
2051	1,645.18	530.68	7,204.99	297.22	585.00	1,148.10	1,000.67	378.64	681.89	843.70	531.37	3,538.98	6,290.71
2052	1,675.65	537.87	7,325.79	301.13	593.40	1,163.77	1,008.31	382.54	692.27	855.59	538.44	3,596.59	6,389.01
2053	1,706.69	545.16	7,448.62	305.08	601.93	1,179.64	1,016.00	386.48	702.81	867.65	545.61	3,655.15	6,488.84
2054	1,738.30	552.55	7,573.51	309.09	610.57	1,195.74	1,023.76	390.46	713.51	879.88	552.87	3,714.65	6,590.22
2055	1,770.49	560.04	7,700.49	313.15	619.34	1,212.05	1,031.57	394.49	724.37	892.28	560.23	3,775.13	6,693.20

Notes: Actual Woods & Poole data for 2010 through 2020, 2025, 2030, 2035, and 2040.
Missing estimates through 2040 calculated using average annual growth rate for the 5-year period; projections after 2040 calculated using the average annual growth rate from 2035 to 2040.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-8

Demographic and Employment Baseline Projections for Economic Impact Area TX-1

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	1,644	1,800	1,833	1,866	1,901	1,935	1,969	2,108	2,319	2,494	2,844
Age Under 19 Years	36.0%	35.0%	34.8%	34.6%	34.4%	34.3%	34.2%	33.7%	32.5%	32.2%	31.3%
Age 20 to 34	21.1%	20.5%	20.4%	20.3%	20.2%	20.2%	20.1%	19.8%	20.3%	19.9%	19.8%
Age 35 to 49	18.9%	18.7%	18.7%	18.6%	18.5%	18.4%	18.3%	18.1%	17.2%	16.9%	17.2%
Age 50 to 64	13.6%	15.0%	15.2%	15.3%	15.4%	15.4%	15.4%	15.3%	15.4%	15.2%	14.6%
Age 65 and over	10.3%	10.8%	11.0%	11.2%	11.5%	11.7%	12.0%	13.0%	14.6%	15.7%	17.2%
Median Age of Population (years)	33.6	35.6	35.8	35.9	36.0	36.0	36.1	36.4	36.9	37.1	37.2
White Population (in thousands)	18.4%	16.2%	15.9%	15.6%	15.3%	15.0%	14.7%	13.7%	12.3%	11.2%	9.3%
Black Population (in thousands)	1.2%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	0.9%	0.9%
Native American Population (in thousands)	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Asian and Pacific Islander Population (in thousands)	0.9%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.1%	1.1%	1.0%
Hispanic or Latino Population (in thousands)	79.4%	81.5%	81.9%	82.2%	82.5%	82.8%	83.1%	84.1%	85.6%	86.7%	88.7%
Male Population (in thousands)	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.8%	48.7%	48.6%	48.5%
Total Employment (in thousands of jobs)	728.92	799.36	793.09	806.49	821.31	836.42	851.79	916.13	1,021.87	1,119.42	1,344.45
Farm Employment	1.7%	1.7%	1.7%	1.6%	1.6%	1.5%	1.5%	1.4%	1.2%	1.0%	0.8%
Forestry, Fishing, Related Activities	1.2%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	0.9%	0.9%	0.8%
Mining	1.8%	2.4%	2.4%	2.4%	2.3%	2.3%	2.2%	2.1%	1.9%	1.7%	1.4%
Utilities	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%
Construction	7.2%	6.5%	6.3%	6.3%	6.3%	6.3%	6.3%	6.2%	6.2%	6.1%	6.0%
Manufacturing	4.0%	3.2%	3.3%	3.2%	3.2%	3.1%	3.1%	2.9%	2.6%	2.4%	1.9%
Wholesale Trade	2.8%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.4%	2.3%	2.2%	2.0%
Retail Trade	12.0%	11.4%	11.3%	11.2%	11.2%	11.1%	11.1%	10.9%	10.6%	10.3%	9.7%
Transportation and Warehousing	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.4%	3.4%	3.4%	3.4%
Information Employment	1.2%	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	1.0%
Finance and Insurance	3.1%	3.7%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.5%	3.4%
Real Estate/Rental and Lease	3.0%	3.1%	3.4%	3.4%	3.4%	3.3%	3.3%	3.3%	3.2%	3.2%	3.1%
Professional and Technical Services	3.4%	3.5%	3.6%	3.6%	3.6%	3.6%	3.7%	3.8%	3.9%	4.0%	4.2%
Management	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.5%	0.5%
Administrative and Waste Services	5.4%	5.5%	5.7%	5.8%	5.8%	5.9%	5.9%	6.2%	6.5%	6.7%	7.3%
Educational Services	0.9%	0.9%	1.0%	1.0%	1.0%	1.0%	1.0%	1.1%	1.2%	1.3%	1.5%
Health Care and Social Assistance	15.6%	17.3%	17.5%	17.8%	18.0%	18.2%	18.5%	19.4%	20.9%	22.1%	24.6%
Arts, Entertainment, and Recreation	1.1%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Accommodation and Food Services	7.2%	7.7%	7.7%	7.7%	7.8%	7.8%	7.8%	7.8%	7.9%	8.0%	8.0%

Table 4-8. Demographic and Employment Baseline Projections for Economic Impact Area TX-1 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Other Services, Except Public Administration	6.5%	6.1%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%
Federal Civilian Government	1.7%	1.8%	1.8%	1.8%	1.8%	1.7%	1.7%	1.6%	1.5%	1.4%	1.3%
Federal Military	1.3%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	0.9%	0.8%	0.7%	0.6%
State and Local Government	15.1%	14.7%	14.3%	14.2%	14.1%	14.0%	13.9%	13.5%	12.9%	12.4%	11.3%
Total Earnings (in millions of 2005 dollars)	24,168	27,085	28,227	28,852	29,670	30,511	31,377	35,100	41,562	47,889	63,768
Farm	1.6%	0.5%	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%	0.4%	0.3%	0.3%
Forestry, Fishing, Related Activities	0.7%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%
Mining	3.6%	4.7%	4.8%	4.8%	4.8%	4.7%	4.6%	4.4%	4.0%	3.6%	3.0%
Utilities	0.6%	0.7%	0.8%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%	0.6%
Construction	7.5%	6.3%	6.1%	6.0%	5.9%	5.9%	5.8%	5.5%	5.1%	4.8%	4.2%
Manufacturing	5.9%	5.2%	5.2%	5.2%	5.2%	5.1%	5.0%	4.8%	4.5%	4.2%	3.7%
Wholesale Trade	4.2%	3.7%	3.8%	3.8%	3.8%	3.7%	3.7%	3.6%	3.5%	3.4%	3.2%
Retail Trade	8.8%	7.8%	7.8%	7.7%	7.6%	7.5%	7.4%	7.0%	6.4%	5.9%	5.0%
Transportation and Warehousing	3.6%	3.9%	3.9%	3.9%	3.9%	3.8%	3.8%	3.8%	3.7%	3.6%	3.4%
Information	1.5%	1.3%	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.7%
Finance and Insurance	3.4%	3.1%	3.1%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%
Real Estate/Rental and Lease	1.4%	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.1%	1.1%	1.0%	1.0%
Professional and Technical Services	4.6%	4.4%	4.5%	4.6%	4.6%	4.7%	4.7%	5.0%	5.3%	5.5%	6.0%
Management	0.1%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.4%	0.5%	0.5%	0.8%
Administrative and Waste Services	3.0%	3.3%	3.5%	3.6%	3.6%	3.7%	3.7%	3.9%	4.2%	4.4%	4.9%
Educational Services	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.8%	0.9%	1.0%	1.2%
Health Care and Social Assistance	14.9%	17.6%	17.7%	18.1%	18.4%	18.7%	19.0%	20.1%	21.9%	23.5%	26.7%
Arts, Entertainment, and Recreation	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Accommodation and Food Services	3.4%	3.6%	3.7%	3.7%	3.8%	3.8%	3.8%	3.8%	3.9%	3.9%	3.9%
Other Services, Except Public Administration	4.5%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.1%	4.0%	4.0%	3.9%
Federal Civilian Government	4.9%	5.6%	5.4%	5.5%	5.4%	5.4%	5.4%	5.3%	5.1%	5.0%	4.7%
Federal Military	2.8%	2.5%	2.4%	2.4%	2.4%	2.4%	2.3%	2.3%	2.2%	2.1%	2.0%
State and Local Government	17.8%	18.6%	17.9%	18.0%	17.9%	17.9%	17.8%	17.6%	17.3%	16.9%	16.2%
Total Personal Income Per Capita (in 2005 dollars)	20,907	23,257	23,914	23,887	24,058	24,302	24,593	26,031	28,749	31,518	38,559
Woods & Poole Economics Wealth Index (U.S. = 100)	67.9	78.0	79.0	78.9	79.2	79.4	79.6	80.3	81.2	81.9	83.0
Persons per Household (in number of people)	3.2	3.3	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.3
Mean Household Total Personal Income (in 2005 dollars)	67,317	75,702	77,591	77,212	77,464	77,910	78,531	82,496	91,564	101,445	126,955
Number of Households (in thousands)	510.57	552.84	564.82	577.44	590.27	603.52	616.71	665.25	728.15	775.02	863.66
Income <$10,000 (thousands of households, 2000$)	15.7%	13.7%	13.3%	13.1%	12.9%	12.7%	12.5%	11.3%	9.4%	8.0%	5.8%
Income $10,000 to $19,999	17.7%	15.5%	15.0%	14.8%	14.6%	14.4%	14.1%	12.8%	10.6%	9.1%	6.6%
Income $20,000 to $29,999	15.0%	13.4%	13.0%	12.8%	12.6%	12.4%	12.2%	11.0%	9.1%	7.8%	5.7%

Table 4-8. Demographic and Employment Baseline Projections for Economic Impact Area TX-1 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Income $30,000 to $44,999	18.8%	19.9%	20.0%	20.0%	20.1%	20.2%	20.2%	20.0%	17.9%	15.4%	11.3%
Income $45,000 to $59,999	12.4%	14.2%	14.7%	14.8%	15.0%	15.2%	15.5%	16.7%	19.1%	20.2%	17.8%
Income $60,000 to $74,999	7.7%	8.8%	9.1%	9.2%	9.3%	9.5%	9.6%	10.6%	12.8%	14.8%	18.8%
Income $75,000 to $99,999	6.6%	7.5%	7.8%	7.9%	8.0%	8.1%	8.2%	9.0%	10.9%	12.7%	17.5%
Income $100,000 or more	6.1%	7.0%	7.2%	7.3%	7.4%	7.5%	7.7%	8.5%	10.2%	11.9%	16.5%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the counties in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-9

Demographic and Employment Baseline Projections for Economic Impact Area TX-2

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	581.75	626.81	635.42	644.27	653.22	662.24	671.29	708.03	763.95	810.43	902.92
Age Under 19 Years	29.5%	29.2%	29.4%	29.4%	29.3%	29.3%	29.3%	29.5%	29.4%	29.3%	29.1%
Age 20 to 34	18.7%	18.2%	18.1%	18.1%	18.2%	18.3%	18.3%	18.1%	18.9%	19.2%	19.9%
Age 35 to 49	22.5%	20.7%	20.3%	19.9%	19.5%	19.2%	19.0%	18.6%	17.4%	17.2%	17.7%
Age 50 to 64	17.1%	19.1%	19.4%	19.5%	19.6%	19.6%	19.5%	18.8%	17.2%	16.0%	14.9%
Age 65 and over	12.2%	12.8%	12.9%	13.1%	13.4%	13.6%	13.9%	15.0%	17.1%	18.2%	18.4%
Median Age of Population (years)	39.1	40.5	40.5	40.5	40.4	40.3	40.2	39.9	38.9	37.9	36.3
White Population (in thousands)	58.8%	54.4%	53.7%	53.1%	52.5%	52.0%	51.4%	49.0%	45.5%	42.5%	36.7%
Black Population (in thousands)	9.2%	10.1%	10.2%	10.3%	10.4%	10.4%	10.5%	10.8%	11.4%	12.0%	13.2%
Native American Population (in thousands)	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%
Asian and Pacific Islander Population (in thousands)	2.3%	3.3%	3.4%	3.4%	3.5%	3.6%	3.7%	3.9%	4.3%	4.5%	4.9%
Hispanic or Latino Population (in thousands)	29.5%	31.9%	32.4%	32.9%	33.3%	33.7%	34.2%	35.9%	38.6%	40.8%	45.0%
Male Population (in thousands)	50.2%	50.2%	50.2%	50.1%	50.1%	50.1%	50.1%	50.1%	49.9%	49.8%	49.6%
Total Employment (in thousands of jobs)	287.62	303.96	303.60	307.79	312.42	317.11	321.84	341.33	372.17	399.35	457.64
Farm Employment	7.4%	6.9%	6.7%	6.6%	6.6%	6.5%	6.5%	6.3%	6.0%	5.7%	5.3%
Forestry, Fishing, Related Activities	1.2%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%
Mining	2.4%	3.1%	3.1%	3.2%	3.2%	3.2%	3.2%	3.3%	3.4%	3.5%	3.5%
Utilities	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%
Construction	9.6%	8.3%	7.9%	7.9%	7.9%	8.0%	8.0%	8.1%	8.2%	8.4%	8.6%
Manufacturing	9.7%	9.1%	9.4%	9.4%	9.3%	9.3%	9.2%	9.0%	8.7%	8.4%	7.8%
Wholesale Trade	2.7%	2.7%	2.8%	2.8%	2.8%	2.8%	2.8%	2.7%	2.6%	2.5%	2.2%
Retail Trade	11.3%	11.1%	11.2%	11.2%	11.2%	11.2%	11.2%	11.3%	11.3%	11.4%	11.4%
Transportation and Warehousing	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	3.0%	3.0%	3.0%
Information Employment	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Finance and Insurance	3.4%	4.3%	4.4%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.5%	4.4%
Real Estate/Rental and Lease	3.4%	3.7%	4.1%	4.2%	4.2%	4.2%	4.2%	4.4%	4.6%	4.8%	5.2%
Professional and Technical Services	3.9%	4.3%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.5%	4.5%
Management	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Administrative and Waste Services	4.6%	4.2%	4.3%	4.3%	4.4%	4.4%	4.4%	4.5%	4.6%	4.7%	4.8%
Educational Services	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.4%	1.5%	1.8%
Health Care and Social Assistance	7.7%	8.1%	7.9%	7.9%	8.0%	8.0%	8.0%	8.2%	8.5%	8.7%	9.1%
Arts, Entertainment, and Recreation	1.2%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.5%	1.5%	1.6%
Accommodation and Food Services	5.6%	6.3%	6.3%	6.4%	6.5%	6.5%	6.6%	6.8%	7.2%	7.6%	8.4%

Table 4-9. Demographic and Employment Baseline Projections for Economic Impact Area TX-2 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Other Services, Except Public Administration	6.5%	6.0%	5.9%	5.9%	5.9%	5.9%	6.0%	6.0%	6.0%	6.1%	6.1%
Federal Civilian Government	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%
Federal Military	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.3%
State and Local Government	12.9%	12.8%	12.4%	12.3%	12.2%	12.0%	11.9%	11.4%	10.7%	10.1%	9.0%
Total Earnings (in millions of 2005 dollars)	10,282	10,582	10,999	11,119	11,391	11,669	11,952	13,148	15,135	16,981	21,240
Farm	3.5%	0.8%	0.8%	1.3%	1.3%	1.3%	1.3%	1.2%	1.2%	1.1%	1.0%
Forestry, Fishing, Related Activities	0.7%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.5%
Mining	4.3%	4.9%	4.9%	5.1%	5.1%	5.2%	5.2%	5.5%	5.8%	6.1%	6.6%
Utilities	1.6%	1.8%	1.8%	1.7%	1.7%	1.7%	1.8%	1.9%	2.1%	2.2%	2.6%
Construction	11.7%	10.2%	9.6%	9.8%	9.8%	9.7%	9.7%	9.5%	9.3%	9.1%	8.7%
Manufacturing	20.2%	18.9%	19.0%	19.3%	19.3%	19.3%	19.3%	19.2%	19.0%	18.8%	18.3%
Wholesale Trade	3.5%	4.0%	4.2%	3.9%	3.9%	3.9%	3.9%	3.8%	3.7%	3.6%	3.4%
Retail Trade	8.1%	7.8%	7.9%	7.9%	7.9%	7.8%	7.7%	7.5%	7.2%	6.9%	6.3%
Transportation and Warehousing	3.5%	3.9%	4.0%	3.6%	3.6%	3.6%	3.6%	3.6%	3.5%	3.5%	3.4%
Information	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.9%	0.9%	0.9%	1.0%
Finance and Insurance	3.0%	3.4%	3.6%	3.7%	3.7%	3.7%	3.7%	3.8%	3.8%	3.9%	4.0%
Real Estate / Rental and Lease	1.5%	1.4%	1.6%	1.6%	1.7%	1.7%	1.7%	1.7%	1.8%	1.8%	2.0%
Professional and Technical Services	3.9%	4.4%	4.4%	4.2%	4.2%	4.2%	4.3%	4.4%	4.5%	4.7%	4.9%
Management	0.1%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%
Administrative and Waste Services	2.5%	2.4%	2.5%	2.5%	2.5%	2.5%	2.5%	2.6%	2.7%	2.8%	2.9%
Educational Services	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%	0.8%	1.0%
Health Care and Social Assistance	7.5%	9.2%	9.2%	8.9%	9.0%	9.0%	9.1%	9.4%	9.8%	10.1%	10.8%
Arts, Entertainment, and Recreation	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.6%
Accommodation and Food Services	2.2%	2.7%	2.8%	2.7%	2.8%	2.8%	2.8%	2.9%	3.1%	3.3%	3.7%
Other Services, Except Public Administration	5.2%	4.8%	4.7%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%
Federal Civilian Government	0.9%	1.0%	0.9%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	0.9%	0.9%
Federal Military	0.6%	0.7%	0.7%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
State and Local Government	13.9%	15.2%	14.6%	14.7%	14.5%	14.4%	14.3%	13.8%	13.2%	12.6%	11.6%
Total Personal Income per Capita (in 2005 dollars)	29,554	33,231	34,468	34,221	34,427	34,739	35,117	36,968	40,349	43,692	51,861
Woods & Poole Economics Wealth Index (U.S. = 100)	78.4	86.6	87.4	87.4	87.6	87.8	88.1	89.0	90.4	91.5	93.6
Persons per Household (in number of people)	2.7	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.7	2.7	2.8
Mean Household Total Personal Income (in 2005 dollars)	81,195	92,621	95,720	94,639	94,810	95,225	95,851	100,031	109,574	119,784	145,184
Number of Households (in thousands)	211.75	224.89	228.81	232.96	237.20	241.59	245.94	261.66	281.32	295.61	322.53
Income <$10,000 (thousands of households, 2000$)	9.6%	8.2%	7.9%	7.9%	7.7%	7.6%	7.5%	6.8%	5.7%	4.9%	3.6%
Income $10,000 to $19,999	12.9%	11.1%	10.7%	10.6%	10.5%	10.3%	10.1%	9.2%	7.9%	6.8%	5.0%

Table 4-9. Demographic and Employment Baseline Projections for Economic Impact Area TX-2 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Income $20,000 to $29,999	12.9%	11.2%	10.8%	10.7%	10.5%	10.4%	10.2%	9.4%	8.0%	6.9%	5.2%
Income $30,000 to $44,999	17.5%	16.1%	15.7%	15.6%	15.4%	15.2%	15.0%	13.8%	11.8%	10.2%	7.6%
Income $45,000 to $59,999	14.3%	15.2%	15.3%	15.4%	15.4%	15.4%	15.5%	15.6%	14.5%	12.9%	9.3%
Income $60,000 to $74,999	11.2%	13.0%	13.5%	13.6%	13.8%	14.0%	14.2%	15.3%	16.8%	17.3%	15.4%
Income $75,000 to $99,999	10.9%	12.8%	13.3%	13.3%	13.5%	13.8%	14.0%	15.2%	17.9%	20.8%	26.8%
Income $100,000 or more	10.5%	12.3%	12.8%	12.9%	13.1%	13.3%	13.6%	14.7%	17.4%	20.2%	27.2%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the counties in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-10

Demographic and Employment Baseline Projections for Economic Impact Area TX-3

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	5,518	6,202	6,319	6,437	6,557	6,676	6,797	7,283	8,019	8,630	9,846
Age Under 19 Years	31.0%	30.4%	30.5%	30.5%	30.4%	30.4%	30.3%	30.3%	29.9%	29.6%	29.2%
Age 20 to 34	22.1%	21.8%	21.6%	21.5%	21.5%	21.5%	21.3%	20.9%	21.2%	21.3%	21.4%
Age 35 to 49	22.7%	21.3%	21.1%	20.8%	20.6%	20.4%	20.3%	20.1%	19.0%	18.6%	18.6%
Age 50 to 64	15.6%	17.4%	17.6%	17.7%	17.7%	17.7%	17.7%	17.2%	16.4%	15.9%	15.3%
Age 65 and over	8.5%	9.1%	9.2%	9.5%	9.7%	10.0%	10.3%	11.5%	13.5%	14.5%	15.5%
Median Age of Population (years)	37.3	38.2	38.3	38.4	38.4	38.5	38.5	38.5	38.5	38.6	38.3
White Population (in thousands)	46.0%	41.9%	41.2%	40.6%	39.9%	39.3%	38.7%	36.2%	32.7%	30.0%	25.2%
Black Population (in thousands)	17.6%	17.9%	17.8%	17.7%	17.6%	17.6%	17.5%	17.1%	16.6%	16.1%	15.1%
Native American Population (in thousands)	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%
Asian and Pacific Islander Population (in thousands)	5.6%	6.3%	6.5%	6.6%	6.7%	6.8%	7.0%	7.5%	8.2%	8.8%	9.9%
Hispanic or Latino Population (in thousands)	30.5%	33.6%	34.3%	34.9%	35.5%	36.1%	36.6%	38.9%	42.2%	44.8%	49.6%
Male Population (in thousands)	49.8%	49.8%	49.8%	49.8%	49.8%	49.7%	49.7%	49.7%	49.7%	49.6%	49.4%
Total Employment (in thousands of jobs)	3,219	3,605	3,649	3,709	3,776	3,844	3,913	4,199	4,660	5,076	6,001
Farm Employment	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%
Forestry, Fishing, Related Activities	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Mining	2.8%	3.6%	3.6%	3.6%	3.6%	3.7%	3.7%	3.7%	3.7%	3.8%	3.7%
Utilities	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Construction	8.0%	7.5%	7.1%	7.2%	7.2%	7.2%	7.3%	7.4%	7.6%	7.7%	8.0%
Manufacturing	7.4%	7.1%	7.3%	7.2%	7.1%	7.0%	7.0%	6.6%	6.1%	5.7%	5.0%
Wholesale Trade	4.5%	4.4%	4.5%	4.5%	4.5%	4.4%	4.4%	4.3%	4.1%	4.0%	3.7%
Retail Trade	10.2%	9.6%	9.7%	9.6%	9.6%	9.6%	9.6%	9.5%	9.4%	9.2%	9.0%
Transportation and Warehousing	4.3%	4.3%	4.3%	4.3%	4.4%	4.4%	4.4%	4.5%	4.7%	4.8%	5.0%
Information Employment	1.5%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.1%	1.0%	1.0%	0.9%
Finance and Insurance	4.5%	5.0%	5.0%	5.0%	5.0%	4.9%	4.9%	4.8%	4.6%	4.5%	4.2%
Real Estate/Rental and Lease	4.1%	4.3%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.6%	4.6%	4.5%
Professional and Technical Services	7.8%	7.9%	7.9%	7.9%	7.9%	7.9%	7.9%	8.0%	8.0%	8.1%	8.1%
Management	0.6%	0.8%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	1.0%
Administrative and Waste Services	7.4%	7.1%	7.2%	7.3%	7.3%	7.4%	7.4%	7.6%	7.8%	8.0%	8.4%
Educational Services	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.7%	1.8%	1.9%	2.1%
Health Care and Social Assistance	8.2%	8.9%	8.9%	8.9%	9.0%	9.1%	9.2%	9.6%	10.1%	10.6%	11.5%
Arts, Entertainment, and Recreation	1.5%	1.5%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.3%	1.3%	1.3%
Accommodation and Food Services	6.5%	7.0%	7.0%	7.1%	7.1%	7.1%	7.1%	7.2%	7.4%	7.5%	7.7%

Table 4-10. Demographic and Employment Baseline Projections for Economic Impact Area TX-3 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Other Services, Except Public Administration	6.0%	5.7%	5.6%	5.7%	5.7%	5.7%	5.7%	5.9%	6.1%	6.2%	6.5%
Federal Civilian Government	1.0%	0.9%	0.8%	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%	0.6%	0.5%
Federal Military	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%
State and Local Government	10.3%	9.7%	9.4%	9.3%	9.2%	9.2%	9.1%	8.8%	8.4%	8.1%	7.5%
Total Earnings (in millions of 2005 dollars)	186,536	220,484	232,312	238,826	245,613	252,572	259,707	290,089	341,626	390,638	507,723
Farm	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Forestry, Fishing, Related Activities	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Mining	12.3%	15.2%	15.4%	15.5%	15.6%	15.7%	15.7%	16.1%	16.5%	16.8%	17.3%
Utilities	1.6%	2.1%	2.1%	2.1%	2.1%	2.2%	2.2%	2.3%	2.4%	2.5%	2.7%
Construction	8.2%	6.8%	6.3%	6.3%	6.3%	6.3%	6.2%	6.1%	6.0%	5.9%	5.6%
Manufacturing	11.7%	11.3%	11.6%	11.5%	11.4%	11.3%	11.2%	10.8%	10.2%	9.7%	8.8%
Wholesale Trade	6.2%	6.1%	6.2%	6.1%	6.1%	6.1%	6.1%	5.9%	5.7%	5.6%	5.3%
Retail Trade	5.2%	4.5%	4.5%	4.5%	4.4%	4.4%	4.3%	4.1%	3.8%	3.6%	3.2%
Transportation and Warehousing	5.6%	5.6%	5.6%	5.6%	5.6%	5.7%	5.7%	5.7%	5.7%	5.7%	5.7%
Information	1.7%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.1%	1.1%
Finance and Insurance	5.5%	4.8%	4.6%	4.6%	4.6%	4.5%	4.5%	4.4%	4.3%	4.1%	3.9%
Real Estate/Rental and Lease	2.4%	1.7%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.8%	1.8%	1.7%
Professional and Technical Services	10.8%	11.3%	11.4%	11.5%	11.5%	11.6%	11.7%	11.9%	12.2%	12.5%	13.0%
Management	0.6%	1.0%	1.1%	1.1%	1.2%	1.2%	1.2%	1.3%	1.4%	1.5%	1.7%
Administrative and Waste Services	4.4%	4.1%	4.2%	4.3%	4.3%	4.3%	4.4%	4.5%	4.7%	4.8%	5.2%
Educational Services	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.1%	1.1%	1.2%	1.4%
Health Care and Social Assistance	6.5%	7.1%	7.0%	7.1%	7.2%	7.2%	7.3%	7.6%	8.0%	8.4%	9.2%
Arts, Entertainment, and Recreation	0.7%	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Accommodation and Food Services	2.3%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.4%	2.4%
Other Services, Except Public Administration	3.1%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	3.0%	3.0%	3.1%	3.1%
Federal Civilian Government	1.7%	1.6%	1.5%	1.5%	1.5%	1.5%	1.5%	1.4%	1.3%	1.3%	1.2%
Federal Military	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
State and Local Government	8.3%	8.3%	7.9%	7.9%	7.8%	7.8%	7.7%	7.6%	7.3%	7.1%	6.7%
Total Personal Income per Capita (in 2005 dollars)	39,184	42,898	44,457	44,442	44,669	45,041	45,509	47,897	52,489	57,178	69,012
Woods & Poole Economics Wealth Index (U.S. = 100)	84.6	92.8	93.5	93.4	93.5	93.6	93.7	93.9	94.3	94.9	96.4
Persons per Household (in number of people)	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.8	2.9

Table 4-10. Demographic and Employment Baseline Projections for Economic Impact Area TX-3 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Mean Household Total Personal Income (in 2005 dollars)	107,917	122,164	126,117	125,537	125,633	126,076	126,822	132,266	145,382	159,816	196,851
Number of Households (in thousands)	2,004	2,178	2,227	2,279	2,331	2,385	2,439	2,637	2,895	3,088	3,452
Income <$10,000 (thousands of households, 2000$)	8.7%	7.6%	7.4%	7.3%	7.2%	7.1%	7.0%	6.4%	5.6%	5.0%	3.9%
Income $10,000 to $19,999	10.9%	9.7%	9.4%	9.3%	9.2%	9.0%	8.9%	8.2%	7.2%	6.4%	4.9%
Income $20,000 to $29,999	11.9%	10.6%	10.3%	10.2%	10.0%	9.9%	9.8%	9.0%	7.9%	7.0%	5.5%
Income $30,000 to $44,999	16.7%	15.1%	14.6%	14.5%	14.3%	14.2%	14.0%	12.9%	11.3%	10.1%	7.9%
Income $45,000 to $59,999	14.0%	14.5%	14.5%	14.4%	14.4%	14.4%	14.3%	13.7%	12.3%	10.9%	8.5%
Income $60,000 to $74,999	10.9%	12.1%	12.4%	12.5%	12.6%	12.8%	12.9%	13.8%	14.7%	14.7%	12.2%
Income $75,000 to $99,999	11.4%	12.9%	13.3%	13.5%	13.6%	13.8%	14.0%	15.1%	17.2%	19.1%	21.8%
Income $100,000 or more	15.5%	17.5%	18.1%	18.4%	18.6%	18.8%	19.1%	20.7%	23.8%	26.9%	35.3%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the counties in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-11

Demographic and Employment Baseline Projections for Economic Impact Area LA-1

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	338.48	345.97	349.09	352.34	355.65	358.98	362.34	376.06	397.01	414.37	448.81
Age Under 19 Years	29.2%	28.6%	28.6%	28.6%	28.6%	28.5%	28.6%	28.9%	28.9%	28.4%	27.3%
Age 20 to 34	21.8%	21.3%	21.1%	21.0%	20.8%	20.6%	20.3%	18.9%	18.1%	18.3%	19.5%
Age 35 to 49	21.1%	19.4%	19.1%	18.8%	18.7%	18.5%	18.5%	18.9%	19.0%	18.4%	16.9%
Age 50 to 64	16.3%	18.4%	18.7%	18.9%	19.0%	19.2%	19.2%	18.7%	17.2%	16.7%	17.6%
Age 65 and over	11.7%	12.4%	12.5%	12.8%	13.0%	13.2%	13.4%	14.6%	16.8%	18.1%	18.6%
Median Age of Population (years)	34.9	36.2	36.3	36.4	36.5	36.6	36.7	37.3	38.0	38.1	38.5
White Population (in thousands)	74.7%	74.0%	73.9%	73.9%	73.8%	73.7%	73.6%	73.2%	72.6%	72.0%	70.8%
Black Population (in thousands)	20.9%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.0%	21.1%	21.1%
Native American Population (in thousands)	0.7%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%
Asian and Pacific Islander Population (in thousands)	1.0%	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%	1.3%	1.4%	1.6%	1.8%
Hispanic or Latino Population (in thousands)	2.7%	3.1%	3.2%	3.2%	3.3%	3.4%	3.4%	3.7%	4.2%	4.6%	5.6%
Male Population (in thousands)	49.9%	50.0%	50.0%	50.0%	50.0%	50.0%	50.1%	50.1%	50.1%	50.2%	50.2%
Total Employment (in thousands of jobs)	171.65	178.79	176.78	178.85	181.19	183.55	185.95	195.88	211.77	226.00	257.49
Farm Employment	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.8%	1.8%	1.7%	1.6%	1.4%
Forestry, Fishing, Related Activities	1.0%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Mining	1.1%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.3%	1.3%	1.3%	1.2%
Utilities	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.2%
Construction	8.7%	8.3%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.1%	8.0%
Manufacturing	6.7%	6.4%	6.6%	6.5%	6.3%	6.2%	6.0%	5.5%	4.8%	4.2%	3.3%
Wholesale Trade	2.2%	2.1%	2.2%	2.2%	2.2%	2.2%	2.1%	2.1%	2.0%	2.0%	1.9%
Retail Trade	11.0%	10.5%	10.5%	10.6%	10.6%	10.6%	10.7%	10.8%	11.0%	11.1%	11.3%
Transportation and Warehousing	3.2%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%
Information Employment	1.0%	1.0%	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	0.9%	0.9%	0.8%
Finance and Insurance	2.5%	3.1%	3.2%	3.2%	3.2%	3.2%	3.2%	3.1%	3.0%	3.0%	2.8%
Real Estate/Rental and Lease	2.4%	2.8%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.1%	3.0%
Professional and Technical Services	4.7%	4.3%	4.2%	4.2%	4.2%	4.3%	4.3%	4.4%	4.6%	4.8%	5.1%
Management	0.7%	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%
Administrative and Waste Services	3.8%	4.3%	4.4%	4.5%	4.5%	4.5%	4.6%	4.8%	5.0%	5.2%	5.6%
Educational Services	1.0%	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Health Care and Social Assistance	9.5%	10.1%	10.0%	10.2%	10.3%	10.4%	10.6%	11.1%	12.0%	12.7%	14.2%
Arts, Entertainment, and Recreation	2.3%	1.5%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.3%	1.2%	1.1%
Accommodation and Food Services	7.9%	8.4%	8.6%	8.7%	8.8%	8.8%	8.9%	9.3%	9.9%	10.3%	11.3%

Table 4-11. Demographic and Employment Baseline Projections for Economic Impact Area LA-1 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Other Services, Except Public Administration	6.2%	6.3%	6.3%	6.4%	6.4%	6.5%	6.5%	6.7%	7.0%	7.2%	7.7%
Federal Civilian Government	2.1%	2.0%	2.0%	1.9%	1.9%	1.9%	1.9%	1.7%	1.6%	1.4%	1.2%
Federal Military	5.7%	5.6%	5.5%	5.5%	5.4%	5.3%	5.3%	5.0%	4.7%	4.4%	3.9%
State and Local Government	14.0%	14.0%	13.6%	13.5%	13.4%	13.3%	13.2%	12.8%	12.2%	11.6%	10.6%
Total Earnings (in millions of 2005 dollars)	6,873	7,632	7,785	7,971	8,140	8,313	8,490	9,233	10,471	11,627	14,333
Farm	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%
Forestry, Fishing, Related Activities	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Mining	1.7%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.1%
Utilities	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%	0.6%
Construction	7.6%	8.9%	8.5%	8.5%	8.4%	8.4%	8.3%	8.1%	7.8%	7.6%	7.0%
Manufacturing	14.6%	13.1%	13.6%	13.3%	13.1%	12.9%	12.6%	11.8%	10.6%	9.6%	7.8%
Wholesale Trade	2.7%	2.6%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.7%	2.6%
Retail Trade	6.3%	5.6%	5.7%	5.6%	5.6%	5.6%	5.5%	5.4%	5.3%	5.1%	4.8%
Transportation and Warehousing	3.6%	3.0%	3.0%	3.0%	3.0%	3.0%	3.0%	2.9%	2.9%	2.8%	2.7%
Information	2.6%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.2%	2.2%	2.2%
Finance and Insurance	2.3%	2.6%	3.0%	3.0%	3.0%	3.0%	2.9%	2.9%	2.9%	2.9%	2.8%
Real Estate/Rental and Lease	1.2%	1.2%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Professional and Technical Services	5.4%	5.1%	5.0%	5.0%	5.1%	5.2%	5.2%	5.5%	6.0%	6.4%	7.3%
Management	1.5%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.8%	0.8%	0.9%	1.0%
Administrative and Waste Services	2.3%	2.3%	2.3%	2.4%	2.4%	2.4%	2.5%	2.6%	2.8%	2.9%	3.3%
Educational Services	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%
Health Care and Social Assistance	8.7%	9.5%	9.5%	9.6%	9.8%	10.0%	10.1%	10.7%	11.7%	12.6%	14.3%
Arts, Entertainment, and Recreation	1.5%	0.5%	0.4%	0.6%	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%	0.5%
Accommodation and Food Services	3.7%	4.0%	4.1%	4.1%	4.2%	4.2%	4.3%	4.5%	4.8%	5.1%	5.7%
Other Services, Except Public Administration	3.7%	3.5%	3.4%	3.5%	3.5%	3.5%	3.5%	3.7%	3.8%	3.9%	4.2%
Federal Civilian Government	3.8%	3.5%	3.3%	3.3%	3.3%	3.2%	3.2%	3.1%	2.9%	2.8%	2.5%
Federal Military	10.6%	13.0%	13.1%	13.3%	13.3%	13.4%	13.4%	13.6%	13.8%	14.0%	14.3%
State and Local Government	13.8%	13.9%	13.1%	13.0%	12.9%	12.9%	12.8%	12.6%	12.3%	12.0%	11.4%
Total Personal Income per Capita (in 2005 dollars)	27,227	30,983	31,400	31,443	31,728	32,115	32,568	34,726	38,608	42,397	51,597
Woods & Poole Economics Wealth Index (U.S. = 100)	69.2	81.2	80.1	80.2	80.6	81.0	81.4	82.6	84.4	85.8	88.6
Persons per Household (in number of people)	2.6	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7
Mean Household Total Personal Income (in 2005 dollars)	71,904	82,728	83,519	83,273	83,662	84,276	85,084	89,884	100,192	110,989	137,730
Number of Households (in thousands)	128.17	129.57	131.24	133.04	134.87	136.80	138.70	145.29	152.99	158.29	168.14
Income <$10,000 (thousands of households, 2000$)	12.2%	10.6%	10.4%	10.2%	10.1%	9.9%	9.8%	8.8%	7.4%	6.3%	4.6%
Income $10,000 to $19,999	15.0%	12.9%	12.7%	12.5%	12.3%	12.1%	11.9%	10.8%	9.0%	7.7%	5.6%
Income $20,000 to $29,999	13.2%	11.3%	11.1%	10.9%	10.8%	10.6%	10.4%	9.4%	7.8%	6.7%	4.8%

Table 4-11. Demographic and Employment Baseline Projections for Economic Impact Area LA-1 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Income $30,000 to $44,999	19.6%	18.4%	18.1%	17.9%	17.7%	17.4%	17.1%	15.6%	13.0%	11.1%	8.0%
Income $45,000 to $59,999	14.9%	17.6%	17.9%	18.2%	18.4%	18.6%	18.9%	20.1%	20.1%	18.0%	13.1%
Income $60,000 to $74,999	9.5%	11.1%	11.3%	11.5%	11.7%	11.9%	12.1%	13.5%	16.3%	19.1%	19.8%
Income $75,000 to $99,999	8.7%	10.2%	10.4%	10.6%	10.7%	10.9%	11.1%	12.3%	14.9%	17.6%	25.1%
Income $100,000 or more	6.8%	8.0%	8.1%	8.2%	8.4%	8.5%	8.6%	9.6%	11.5%	13.6%	19.1%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the parishes in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-12

Demographic and Employment Baseline Projections for Economic Impact Area LA-2

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	558.42	584.86	591.72	598.82	606.02	613.28	620.58	650.33	695.86	733.82	809.68
Age Under 19 Years	30.2%	29.1%	28.9%	28.8%	28.8%	28.7%	28.8%	28.9%	28.9%	28.4%	27.3%
Age 20 to 34	20.5%	21.0%	21.1%	21.1%	21.0%	20.9%	20.6%	19.4%	18.0%	17.9%	19.0%
Age 35 to 49	21.9%	19.6%	19.2%	18.8%	18.5%	18.4%	18.3%	18.6%	19.8%	19.6%	17.7%
Age 50 to 64	16.1%	18.5%	18.9%	19.1%	19.3%	19.4%	19.4%	19.0%	16.9%	16.2%	18.0%
Age 65 and over	11.4%	11.8%	11.9%	12.2%	12.4%	12.6%	12.9%	14.0%	16.4%	17.9%	18.1%
Median Age of Population (years)	35.1	35.7	35.8	35.8	35.9	36.0	36.2	36.9	37.8	38.5	38.7
White Population (in thousands)	69.1%	68.0%	67.8%	67.6%	67.5%	67.3%	67.2%	66.5%	65.4%	64.5%	62.6%
Black Population (in thousands)	27.5%	27.7%	27.7%	27.8%	27.8%	27.9%	27.9%	28.1%	28.5%	28.7%	29.3%
Native American Population (in thousands)	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Asian and Pacific Islander Population (in thousands)	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.4%	1.5%	1.6%	1.8%
Hispanic or Latino Population (in thousands)	2.0%	2.8%	2.9%	3.0%	3.1%	3.2%	3.3%	3.6%	4.2%	4.8%	6.1%
Male Population (in thousands)	48.7%	48.8%	48.8%	48.9%	48.9%	48.9%	49.0%	49.1%	49.3%	49.3%	49.5%
Total Employment (in thousands of jobs)	297.51	326.06	323.47	328.23	333.53	338.91	344.32	366.60	401.84	432.94	500.08
Farm Employment	1.9%	1.8%	1.7%	1.7%	1.7%	1.7%	1.6%	1.6%	1.4%	1.3%	1.2%
Forestry, Fishing, Related Activities	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Mining	6.9%	8.3%	8.2%	8.2%	8.1%	8.0%	7.9%	7.6%	7.1%	6.6%	5.7%
Utilities	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%
Construction	6.7%	6.3%	6.3%	6.3%	6.3%	6.3%	6.3%	6.2%	6.1%	6.0%	5.9%
Manufacturing	6.1%	5.6%	5.6%	5.6%	5.5%	5.5%	5.4%	5.2%	4.9%	4.6%	4.2%
Wholesale Trade	3.7%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.6%	3.5%	3.5%
Retail Trade	11.5%	10.8%	10.9%	10.9%	10.9%	11.0%	11.0%	11.1%	11.2%	11.3%	11.5%
Transportation and Warehousing	3.5%	3.0%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	3.0%	3.0%	3.1%
Information Employment	1.5%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.1%	1.1%
Finance and Insurance	3.4%	3.6%	3.7%	3.7%	3.6%	3.6%	3.6%	3.5%	3.3%	3.1%	2.9%
Real Estate/Rental and Lease	4.0%	4.5%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.9%	4.8%
Professional and Technical Services	4.7%	5.3%	5.4%	5.4%	5.4%	5.4%	5.5%	5.5%	5.5%	5.6%	5.6%
Management	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Administrative and Waste Services	4.6%	4.5%	4.4%	4.5%	4.5%	4.5%	4.6%	4.7%	4.9%	5.1%	5.4%
Educational Services	1.2%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.4%	1.5%	1.6%
Health Care and Social Assistance	11.2%	11.7%	11.7%	11.8%	11.9%	12.0%	12.1%	12.5%	13.2%	13.8%	14.9%
Arts, Entertainment, and Recreation	1.5%	1.8%	1.7%	1.7%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	2.0%
Accommodation and Food Services	6.4%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%	6.5%

Table 4-12. Demographic and Employment Baseline Projections for Economic Impact Area LA-2 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Other Services, Except Public Administration	7.0%	6.9%	6.7%	6.8%	6.9%	6.9%	7.0%	7.2%	7.6%	7.9%	8.6%
Federal Civilian Government	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%
Federal Military	0.9%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.5%	0.5%
State and Local Government	10.8%	10.3%	9.9%	9.9%	9.8%	9.8%	9.8%	9.6%	9.3%	9.1%	8.7%
Total Earnings (in millions of 2005 dollars)	11,484	13,312	13,615	13,889	14,240	14,598	14,964	16,506	19,069	21,453	26,985
Farm	0.8%	1.2%	1.2%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	0.9%	0.8%
Forestry, Fishing, Related Activities	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Mining	13.7%	16.0%	16.3%	16.2%	16.1%	16.0%	15.8%	15.3%	14.5%	13.7%	12.2%
Utilities	0.4%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%
Construction	7.1%	6.7%	6.8%	6.6%	6.6%	6.5%	6.5%	6.2%	5.9%	5.6%	5.1%
Manufacturing	7.5%	7.4%	7.3%	7.3%	7.3%	7.3%	7.2%	7.2%	7.1%	7.0%	6.7%
Wholesale Trade	4.7%	4.5%	4.4%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%	4.7%
Retail Trade	7.9%	7.0%	7.0%	7.0%	7.0%	6.9%	6.9%	6.7%	6.4%	6.2%	5.8%
Transportation and Warehousing	4.6%	3.8%	3.7%	3.6%	3.6%	3.6%	3.6%	3.6%	3.5%	3.5%	3.5%
Information	1.7%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.4%	1.4%
Finance and Insurance	4.1%	3.0%	3.2%	3.2%	3.2%	3.2%	3.2%	3.1%	2.9%	2.8%	2.6%
Real Estate/Rental and Lease	3.5%	3.2%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.4%
Professional and Technical Services	6.0%	6.5%	6.7%	6.7%	6.8%	6.8%	6.8%	7.0%	7.2%	7.4%	7.8%
Management	1.6%	1.7%	1.7%	1.7%	1.7%	1.7%	1.8%	1.9%	2.0%	2.2%	2.4%
Administrative and Waste Services	3.1%	3.2%	3.3%	3.3%	3.3%	3.4%	3.4%	3.6%	3.9%	4.1%	4.6%
Educational Services	0.7%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.9%	0.9%	1.0%	1.1%
Health Care and Social Assistance	11.3%	11.6%	11.4%	11.6%	11.8%	11.9%	12.0%	12.5%	13.2%	13.8%	15.1%
Arts, Entertainment, and Recreation	0.6%	0.6%	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%
Accommodation and Food Services	2.5%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.6%	2.7%	2.7%	2.7%
Other Services, Except Public Administration	4.5%	4.4%	4.3%	4.4%	4.4%	4.4%	4.5%	4.6%	4.9%	5.1%	5.5%
Federal Civilian Government	1.2%	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Federal Military	0.9%	0.9%	0.9%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
State and Local Government	11.3%	11.9%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%	11.5%
Total Personal Income per Capita (in 2005 dollars)	28,507	33,562	34,279	34,171	34,409	34,764	35,193	37,276	41,041	44,716	53,577
Woods & Poole Economics Wealth Index (U.S. = 100)	72.9	84.6	84.0	83.8	83.9	84.0	84.1	84.2	84.3	84.2	84.1
Persons per Household (in number of people)	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.5	2.6	2.6	2.6
Mean Household Total Personal Income (in 2005 dollars)	74,766	88,125	89,674	89,017	89,252	89,749	90,459	94,958	104,880	115,331	141,051
Number of Households (in thousands)	212.92	222.74	226.19	229.87	233.64	237.56	241.44	255.29	272.30	284.51	307.55
Income <$10,000 (thousands of households, 2000$)	15.8%	13.4%	13.1%	13.0%	12.8%	12.6%	12.4%	11.2%	9.3%	7.9%	5.7%
Income $10,000 to $19,999	15.2%	13.0%	12.7%	12.6%	12.4%	12.2%	12.0%	10.9%	9.1%	7.8%	5.7%

Table 4-12. Demographic and Employment Baseline Projections for Economic Impact Area LA-2 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Income $20,000 to $29,999	13.0%	11.3%	11.0%	10.9%	10.7%	10.6%	10.4%	9.4%	7.9%	6.8%	4.9%
Income $30,000 to $44,999	18.3%	18.3%	18.1%	18.0%	17.9%	17.8%	17.7%	16.6%	14.1%	12.1%	8.7%
Income $45,000 to $59,999	14.0%	16.4%	16.7%	16.9%	17.1%	17.3%	17.5%	18.7%	19.8%	19.1%	14.8%
Income $60,000 to $74,999	9.1%	10.6%	10.9%	11.0%	11.2%	11.4%	11.5%	12.7%	15.3%	17.7%	20.5%
Income $75,000 to $99,999	7.4%	8.7%	8.9%	9.1%	9.2%	9.3%	9.5%	10.4%	12.6%	14.7%	20.5%
Income $100,000 or more	7.1%	8.3%	8.5%	8.6%	8.7%	8.8%	9.0%	9.9%	11.9%	13.9%	19.3%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the parishes in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-13

Demographic and Employment Baseline Projections for Economic Impact Area LA-3

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	1,051.06	1,142.20	1,152.19	1,162.61	1,173.21	1,183.90	1,194.65	1,238.45	1,305.17	1,360.25	1,468.98
Age Under 19 Years	29.1%	28.5%	28.2%	28.2%	28.1%	28.1%	28.1%	28.2%	28.3%	27.9%	27.2%
Age 20 to 34	22.6%	22.6%	22.7%	22.6%	22.5%	22.3%	22.1%	20.5%	19.2%	19.2%	20.3%
Age 35 to 49	21.7%	19.7%	19.4%	19.1%	18.9%	18.7%	18.6%	19.2%	20.0%	19.7%	17.5%
Age 50 to 64	16.4%	18.3%	18.6%	18.6%	18.7%	18.8%	18.8%	18.3%	16.7%	16.0%	17.8%
Age 65 and over	10.2%	11.0%	11.2%	11.5%	11.8%	12.1%	12.4%	13.7%	15.8%	17.1%	17.3%
Median Age of Population (years)	34.8	35.7	35.8	35.9	36.0	36.1	36.3	37.1	38.3	39.0	39.2
White Population (in thousands)	65.2%	62.6%	62.3%	62.0%	61.7%	61.4%	61.1%	59.8%	58.0%	56.3%	53.0%
Black Population (in thousands)	29.7%	31.0%	31.2%	31.3%	31.5%	31.6%	31.8%	32.3%	33.1%	33.7%	34.7%
Native American Population (in thousands)	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%
Asian and Pacific Islander Population (in thousands)	1.4%	1.6%	1.6%	1.6%	1.7%	1.7%	1.8%	1.9%	2.1%	2.3%	2.7%
Hispanic or Latino Population (in thousands)	2.6%	3.7%	3.8%	3.9%	4.1%	4.2%	4.3%	4.8%	5.7%	6.5%	8.4%
Male Population (in thousands)	48.7%	48.8%	48.9%	48.9%	48.9%	48.9%	48.9%	49.0%	49.1%	49.2%	49.3%
Total Employment (in thousands of jobs)	606.81	667.39	662.76	671.33	680.95	690.70	700.56	741.18	805.80	863.29	989.11
Farm Employment	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%	0.4%
Forestry, Fishing, Related Activities	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Mining	1.5%	2.0%	2.0%	2.0%	1.9%	1.9%	1.9%	1.8%	1.6%	1.4%	1.1%
Utilities	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%
Construction	9.8%	9.2%	9.3%	9.3%	9.2%	9.2%	9.2%	9.0%	8.7%	8.4%	7.9%
Manufacturing	6.8%	6.4%	6.7%	6.6%	6.5%	6.4%	6.3%	5.9%	5.4%	4.9%	4.1%
Wholesale Trade	3.2%	2.9%	2.9%	2.8%	2.8%	2.8%	2.8%	2.8%	2.7%	2.6%	2.5%
Retail Trade	10.9%	10.3%	10.5%	10.5%	10.4%	10.4%	10.3%	10.1%	9.8%	9.5%	8.9%
Transportation and Warehousing	4.4%	4.6%	4.6%	4.6%	4.6%	4.6%	4.7%	4.7%	4.7%	4.7%	4.6%
Information Employment	1.4%	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	1.0%	0.9%	0.9%
Finance and Insurance	3.5%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.7%	3.6%	3.5%	3.3%
Real Estate/Rental and Lease	3.6%	4.3%	4.6%	4.7%	4.7%	4.7%	4.7%	4.8%	5.0%	5.1%	5.3%
Professional and Technical Services	4.8%	5.2%	5.1%	5.1%	5.1%	5.1%	5.1%	5.2%	5.2%	5.2%	5.2%
Management	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	0.9%
Administrative and Waste Services	5.8%	5.9%	6.0%	6.1%	6.2%	6.3%	6.4%	6.8%	7.5%	8.0%	9.2%
Educational Services	1.1%	1.2%	1.2%	1.3%	1.3%	1.3%	1.3%	1.4%	1.5%	1.7%	1.9%
Health Care and Social Assistance	8.8%	9.6%	9.6%	9.7%	9.8%	9.9%	10.0%	10.4%	10.9%	11.4%	12.4%
Arts, Entertainment, and Recreation	1.3%	1.6%	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%	1.6%	1.7%

Table 4-13. Demographic and Employment Baseline Projections for Economic Impact Area LA-3 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Accommodation and Food Services	6.6%	6.6%	6.6%	6.6%	6.7%	6.7%	6.7%	6.9%	7.1%	7.3%	7.7%
Other Services, Except Public Administration	6.7%	6.7%	6.5%	6.6%	6.6%	6.7%	6.8%	7.0%	7.5%	7.8%	8.6%
Federal Civilian Government	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Federal Military	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.5%
State and Local Government	15.6%	14.4%	13.8%	13.7%	13.6%	13.5%	13.4%	13.1%	12.6%	12.2%	11.3%
Total Earnings (in millions of 2005 dollars)	24,056	28,491	29,000	29,611	30,272	30,947	31,635	34,526	39,312	43,749	54,019
Farm	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%
Forestry, Fishing, Related Activities	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Mining	2.6%	3.4%	3.5%	3.6%	3.6%	3.6%	3.5%	3.4%	3.2%	3.0%	2.6%
Utilities	0.7%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.5%
Construction	10.3%	11.2%	11.6%	11.5%	11.4%	11.3%	11.2%	10.7%	10.0%	9.4%	8.4%
Manufacturing	12.4%	11.7%	12.1%	12.1%	12.0%	11.9%	11.8%	11.4%	10.7%	10.1%	9.0%
Wholesale Trade	4.4%	3.9%	3.9%	3.8%	3.9%	3.9%	3.9%	3.9%	3.9%	3.9%	3.8%
Retail Trade	7.2%	6.3%	6.5%	6.4%	6.3%	6.2%	6.2%	5.9%	5.4%	5.1%	4.4%
Transportation and Warehousing	6.0%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.8%	6.7%	6.5%
Information	1.7%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.3%	1.3%
Finance and Insurance	4.3%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.7%	3.7%	3.7%	3.6%
Real Estate/Rental and Lease	2.1%	1.9%	2.1%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.3%	2.3%
Professional and Technical Services	6.0%	6.6%	6.5%	6.5%	6.6%	6.6%	6.7%	6.9%	7.2%	7.4%	7.8%
Management	1.4%	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%	1.7%	1.8%	1.8%	1.9%
Administrative and Waste Services	3.5%	4.0%	4.3%	4.3%	4.4%	4.5%	4.5%	4.9%	5.6%	6.1%	7.3%
Educational Services	0.6%	0.7%	0.6%	0.7%	0.7%	0.7%	0.7%	0.8%	0.9%	1.0%	1.2%
Health Care and Social Assistance	9.2%	9.5%	9.3%	9.4%	9.6%	9.7%	9.8%	10.3%	11.0%	11.6%	12.9%
Arts, Entertainment, and Recreation	0.7%	0.7%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%
Accommodation and Food Services	2.7%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.6%	2.7%	2.8%	3.0%
Other Services, Except Public Administration	4.1%	3.9%	3.8%	3.8%	3.8%	3.9%	3.9%	4.1%	4.3%	4.5%	5.0%
Federal Civilian Government	1.2%	1.2%	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%	1.3%
Federal Military	0.9%	1.0%	1.0%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.9%
State and Local Government	17.5%	17.0%	16.1%	16.1%	16.1%	16.1%	16.1%	16.0%	15.8%	15.7%	15.4%
Total Personal Income per Capita (in 2005 dollars)	30,406	34,392	35,095	34,955	35,161	35,491	35,898	37,912	41,589	45,186	53,839
Woods & Poole Economics Wealth Index (U.S. = 100)	78.2	88.8	88.3	88.2	88.4	88.6	88.8	89.3	89.8	90.0	89.7
Persons per Household (in number of people)	2.7	2.7	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.7

Table 4-13. Demographic and Employment Baseline Projections for Economic Impact Area LA-3 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Mean Household Total Personal Income (in 2005 dollars)	81,039	92,128	93,644	92,854	92,978	93,385	94,022	98,318	108,048	118,351	143,639
Number of Households (in thousands)	394.36	426.39	431.80	437.66	443.66	449.93	456.12	477.56	502.38	519.34	550.61
Income <$10,000 (thousands of households, 2000$)	12.5%	10.9%	10.7%	10.6%	10.4%	10.3%	10.1%	9.2%	7.7%	6.7%	4.7%
Income $10,000 to $19,999	13.3%	11.7%	11.4%	11.3%	11.1%	11.0%	10.8%	9.9%	8.3%	7.2%	5.1%
Income $20,000 to $29,999	12.2%	10.7%	10.5%	10.4%	10.2%	10.1%	9.9%	9.1%	7.7%	6.7%	4.7%
Income $30,000 to $44,999	17.6%	16.1%	15.9%	15.7%	15.6%	15.4%	15.2%	14.0%	11.8%	10.3%	7.2%
Income $45,000 to $59,999	14.6%	16.4%	16.7%	16.8%	16.9%	17.1%	17.2%	17.6%	16.8%	15.1%	10.7%
Income $60,000 to $74,999	11.0%	12.7%	13.0%	13.1%	13.3%	13.5%	13.8%	15.2%	17.9%	19.7%	18.7%
Income $75,000 to $99,999	9.9%	11.3%	11.6%	11.7%	11.9%	12.0%	12.2%	13.4%	16.0%	18.6%	26.6%
Income $100,000 or more	9.0%	10.1%	10.3%	10.4%	10.5%	10.7%	10.8%	11.7%	13.7%	15.7%	22.3%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the parishes in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-14

Demographic and Employment Baseline Projections for Economic Impact Area LA-4

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	1,431	1,242	1,248	1,254	1,261	1,267	1,274	1,301	1,344	1,379	1,449
Age Under 19 Years	28.5%	26.2%	26.0%	26.0%	26.0%	25.9%	26.0%	26.3%	26.4%	26.0%	25.4%
Age 20 to 34	20.8%	21.3%	21.3%	21.3%	21.1%	20.9%	20.6%	19.0%	17.2%	17.3%	18.6%
Age 35 to 49	21.9%	20.2%	19.8%	19.4%	19.2%	19.1%	19.0%	19.6%	20.7%	20.3%	17.6%
Age 50 to 64	17.3%	20.2%	20.5%	20.6%	20.6%	20.7%	20.7%	19.9%	17.9%	17.2%	19.2%
Age 65 and over	11.5%	12.3%	12.4%	12.7%	13.1%	13.4%	13.7%	15.3%	17.8%	19.2%	19.4%
Median Age of Population (years)	35.8	36.7	36.8	36.9	37.0	37.1	37.2	37.9	39.2	39.9	39.7
White Population (in thousands)	53.6%	55.0%	54.8%	54.6%	54.5%	54.3%	54.1%	53.3%	52.0%	50.9%	48.4%
Black Population (in thousands)	38.1%	34.5%	34.4%	34.3%	34.3%	34.2%	34.2%	34.0%	33.6%	33.3%	32.6%
Native American Population (in thousands)	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%
Asian and Pacific Islander Population (in thousands)	2.4%	2.6%	2.7%	2.7%	2.7%	2.8%	2.8%	2.9%	3.1%	3.3%	3.4%
Hispanic or Latino Population (in thousands)	5.5%	7.5%	7.7%	7.9%	8.2%	8.4%	8.6%	9.4%	10.8%	12.2%	15.2%
Male Population (in thousands)	48.2%	48.7%	48.8%	48.8%	48.8%	48.9%	48.9%	49.1%	49.3%	49.3%	49.5%
Total Employment (in thousands of jobs)	740.50	739.02	736.37	741.28	747.23	753.21	759.21	783.50	820.83	852.92	920.39
Farm Employment	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%
Forestry, Fishing, Related Activities	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%
Mining	1.3%	1.6%	1.6%	1.6%	1.5%	1.5%	1.5%	1.4%	1.3%	1.2%	1.1%
Utilities	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.2%
Construction	6.2%	6.4%	6.3%	6.3%	6.2%	6.2%	6.2%	6.2%	6.1%	6.0%	5.8%
Manufacturing	5.6%	5.3%	5.4%	5.3%	5.1%	5.0%	4.9%	4.5%	3.9%	3.5%	2.7%
Wholesale Trade	3.6%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%
Retail Trade	10.0%	9.6%	9.4%	9.4%	9.4%	9.4%	9.4%	9.4%	9.3%	9.3%	9.1%
Transportation and Warehousing	4.1%	4.1%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%	4.2%
Information Employment	1.6%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	1.0%	0.9%
Finance and Insurance	3.9%	4.1%	4.2%	4.2%	4.1%	4.1%	4.1%	4.0%	3.8%	3.7%	3.4%
Real Estate/Rental and Lease	4.0%	4.6%	5.0%	5.0%	5.0%	5.0%	5.0%	5.1%	5.1%	5.2%	5.4%
Professional and Technical Services	5.7%	6.7%	6.9%	6.9%	6.9%	7.0%	7.0%	7.0%	7.1%	7.2%	7.3%
Management	1.1%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.2%	1.2%	1.1%	1.0%
Administrative and Waste Services	6.4%	6.3%	6.4%	6.4%	6.5%	6.6%	6.7%	7.0%	7.5%	7.9%	8.9%
Educational Services	3.1%	3.2%	3.1%	3.2%	3.2%	3.2%	3.2%	3.3%	3.5%	3.6%	3.9%
Health Care and Social Assistance	8.8%	9.2%	9.3%	9.3%	9.4%	9.4%	9.4%	9.5%	9.6%	9.7%	9.8%
Arts, Entertainment, and Recreation	2.5%	2.4%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Accommodation and Food Services	8.8%	9.4%	9.6%	9.6%	9.7%	9.7%	9.8%	10.0%	10.2%	10.5%	10.9%

Table 4-14. Demographic and Employment Baseline Projections for Economic Impact Area LA-4 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Other Services, Except Public Administration	6.5%	6.4%	6.3%	6.3%	6.4%	6.5%	6.5%	6.8%	7.2%	7.5%	8.1%
Federal Civilian Government	2.1%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.6%	1.6%	1.6%	1.5%
Federal Military	1.4%	1.1%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	0.9%	0.9%
State and Local Government	11.9%	11.1%	10.7%	10.6%	10.6%	10.5%	10.5%	10.2%	9.8%	9.5%	8.8%
Total Earnings (in millions of 2005 dollars)	33,666	35,386	36,299	36,886	37,499	38,120	38,749	41,359	45,564	49,364	57,886
Farm	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Forestry, Fishing, Related Activities	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Mining	4.4%	5.3%	5.4%	5.3%	5.2%	5.2%	5.1%	4.9%	4.6%	4.3%	3.8%
Utilities	1.2%	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	0.9%	0.9%	0.7%
Construction	6.5%	5.9%	5.6%	5.6%	5.5%	5.5%	5.4%	5.2%	5.0%	4.7%	4.3%
Manufacturing	8.6%	8.8%	8.9%	8.7%	8.6%	8.4%	8.3%	7.8%	7.0%	6.4%	5.3%
Wholesale Trade	5.3%	5.0%	4.9%	5.0%	5.0%	5.0%	5.1%	5.1%	5.2%	5.3%	5.5%
Retail Trade	6.2%	5.5%	5.4%	5.4%	5.3%	5.3%	5.2%	5.0%	4.8%	4.5%	4.1%
Transportation and Warehousing	5.1%	5.5%	5.6%	5.6%	5.6%	5.5%	5.5%	5.4%	5.3%	5.2%	5.0%
Information	1.7%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Finance and Insurance	5.1%	4.6%	4.8%	4.9%	4.8%	4.8%	4.8%	4.7%	4.6%	4.4%	4.2%
Real Estate/Rental and Lease	2.6%	1.5%	1.8%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.8%
Professional and Technical Services	8.0%	9.7%	10.1%	10.2%	10.3%	10.4%	10.5%	10.8%	11.3%	11.6%	12.4%
Management	1.8%	1.8%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%	2.2%
Administrative and Waste Services	4.0%	3.9%	3.8%	4.0%	4.0%	4.1%	4.2%	4.5%	4.9%	5.3%	6.3%
Educational Services	2.2%	2.4%	2.4%	2.4%	2.5%	2.5%	2.5%	2.7%	2.9%	3.0%	3.4%
Health Care and Social Assistance	8.7%	9.8%	10.0%	10.0%	10.1%	10.1%	10.2%	10.4%	10.7%	10.9%	11.2%
Arts, Entertainment, and Recreation	2.1%	1.8%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Accommodation and Food Services	4.4%	4.8%	4.9%	4.9%	5.0%	5.0%	5.0%	5.2%	5.4%	5.5%	5.8%
Other Services, Except Public Administration	3.7%	3.8%	3.7%	3.8%	3.8%	3.9%	3.9%	4.1%	4.3%	4.5%	4.8%
Federal Civilian Government	4.2%	3.6%	3.4%	3.4%	3.5%	3.5%	3.5%	3.6%	3.7%	3.8%	3.9%
Federal Military	1.8%	1.6%	1.6%	1.7%	1.7%	1.7%	1.7%	1.7%	1.8%	1.9%	2.0%
State and Local Government	12.1%	12.0%	11.3%	11.2%	11.2%	11.2%	11.1%	11.0%	10.7%	10.5%	10.0%
Total Personal Income per Capita (in 2005 dollars)	31,461	39,542	40,370	40,549	40,793	41,194	41,690	44,148	48,623	52,995	63,504
Woods & Poole Economics Wealth Index (U.S. = 100)	77.3	94.4	93.4	93.2	93.3	93.3	93.3	93.2	92.9	92.4	90.8
Persons per Household (in number of people)	2.7	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.6

Table 4-14. Demographic and Employment Baseline Projections for Economic Impact Area LA-4 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Mean Household Total Personal Income (in 2005 dollars)	84,130	101,676	103,420	103,452	103,642	104,176	104,983	110,217	121,818	134,024	163,930
Number of Households (in thousands)	535.25	483.19	487.22	491.67	496.25	501.14	505.92	521.30	536.46	545.36	561.22
Income <$10,000 (thousands of households, 2000$)	12.9%	10.4%	10.2%	10.1%	9.9%	9.8%	9.6%	8.8%	7.4%	6.4%	4.7%
Income $10,000 to $19,999	13.7%	11.3%	11.1%	10.9%	10.8%	10.6%	10.5%	9.7%	8.2%	7.1%	5.3%
Income $20,000 to $29,999	13.0%	10.8%	10.6%	10.5%	10.4%	10.2%	10.1%	9.3%	8.0%	7.0%	5.2%
Income $30,000 to $44,999	17.6%	14.8%	14.7%	14.5%	14.4%	14.3%	14.2%	13.2%	11.4%	9.9%	7.4%
Income $45,000 to $59,999	13.6%	15.4%	15.5%	15.5%	15.5%	15.5%	15.5%	15.2%	14.3%	12.9%	9.8%
Income $60,000 to $74,999	10.0%	12.2%	12.4%	12.6%	12.8%	12.9%	13.1%	14.1%	15.8%	16.0%	14.1%
Income $75,000 to $99,999	9.2%	11.7%	11.9%	12.1%	12.3%	12.4%	12.6%	13.8%	16.3%	19.0%	23.5%
Income $100,000 or more	10.1%	13.3%	13.6%	13.8%	14.0%	14.2%	14.4%	15.8%	18.6%	21.7%	29.9%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the parishes in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-15

Demographic and Employment Baseline Projections for Economic Impact Area MS-1

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	483.49	482.25	484.98	487.89	490.88	493.92	496.99	509.64	529.13	545.25	577.12
Age Under 19 Years	28.3%	27.7%	27.5%	27.4%	27.4%	27.4%	27.4%	27.7%	27.7%	27.3%	26.6%
Age 20 to 34	20.3%	19.9%	20.0%	20.0%	19.9%	19.7%	19.5%	18.5%	17.8%	17.7%	18.8%
Age 35 to 49	22.0%	20.4%	20.1%	19.8%	19.5%	19.3%	19.1%	19.2%	19.3%	19.1%	17.7%
Age 50 to 64	17.4%	19.3%	19.6%	19.6%	19.7%	19.9%	19.9%	19.5%	18.2%	17.4%	18.0%
Age 65 and over	11.9%	12.6%	12.8%	13.2%	13.5%	13.8%	14.1%	15.1%	17.1%	18.5%	19.0%
Median Age of Population (years)	36.1	37.3	37.4	37.6	37.7	37.8	37.9	38.3	38.8	39.5	39.5
White Population (in thousands)	75.8%	74.4%	74.2%	74.0%	73.8%	73.6%	73.4%	72.6%	71.4%	70.4%	68.4%
Black Population (in thousands)	18.8%	19.0%	19.1%	19.2%	19.3%	19.4%	19.4%	19.8%	20.4%	20.8%	21.5%
Native American Population (in thousands)	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%
Asian and Pacific Islander Population (in thousands)	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%	2.2%	2.2%
Hispanic or Latino Population (in thousands)	3.0%	4.2%	4.3%	4.4%	4.5%	4.6%	4.7%	5.1%	5.7%	6.3%	7.6%
Male Population (in thousands)	49.7%	49.9%	49.9%	49.9%	49.9%	49.9%	49.9%	49.8%	49.8%	49.8%	49.7%
Total Employment (in thousands of jobs)	238.83	247.21	251.36	253.67	256.30	258.98	261.68	272.70	290.05	305.32	338.26
Farm Employment	1.4%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.1%	1.0%
Forestry, Fishing, Related Activities	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
Mining	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%
Utilities	0.9%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%
Construction	7.5%	8.5%	8.4%	8.4%	8.4%	8.4%	8.4%	8.3%	8.1%	8.0%	7.7%
Manufacturing	9.5%	9.7%	10.2%	10.0%	9.8%	9.6%	9.4%	8.6%	7.6%	6.8%	5.4%
Wholesale Trade	1.4%	1.4%	1.4%	1.3%	1.3%	1.3%	1.3%	1.3%	1.3%	1.2%	1.2%
Retail Trade	10.9%	10.2%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.1%	10.0%
Transportation and Warehousing	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.5%	2.5%	2.5%
Information Employment	1.4%	1.0%	1.0%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Finance and Insurance	2.5%	3.0%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.8%
Real Estate/Rental and Lease	3.1%	3.5%	3.8%	3.8%	3.8%	3.8%	3.9%	3.9%	4.1%	4.1%	4.3%
Professional and Technical Services	3.8%	4.2%	4.4%	4.4%	4.4%	4.5%	4.5%	4.7%	4.9%	5.1%	5.5%
Management	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
Administrative and Waste Services	5.4%	6.4%	6.7%	6.8%	6.9%	7.0%	7.1%	7.5%	8.2%	8.7%	9.9%
Educational Services	0.5%	0.8%	0.8%	0.8%	0.8%	0.9%	0.9%	1.0%	1.2%	1.4%	1.9%
Health Care and Social Assistance	6.2%	6.4%	6.3%	6.4%	6.5%	6.5%	6.6%	6.9%	7.4%	7.7%	8.5%
Arts, Entertainment, and Recreation	2.2%	2.1%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%	2.0%	2.0%	2.1%
Accommodation and Food Services	12.1%	10.2%	10.0%	10.0%	10.0%	9.9%	9.9%	9.7%	9.5%	9.2%	8.8%

Table 4-15. Demographic and Employment Baseline Projections for Economic Impact Area MS-1 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Other Services, Except Public Administration	5.5%	5.1%	5.0%	5.0%	5.1%	5.1%	5.2%	5.4%	5.8%	6.1%	6.7%
Federal Civilian Government	3.9%	3.8%	3.8%	3.8%	3.8%	3.7%	3.7%	3.6%	3.4%	3.3%	3.0%
Federal Military	5.7%	5.2%	5.1%	5.0%	5.0%	4.9%	4.9%	4.7%	4.5%	4.3%	3.9%
State and Local Government	12.3%	12.9%	12.8%	12.8%	12.8%	12.8%	12.7%	12.7%	12.6%	12.6%	12.3%
Total Earnings (in millions of 2005 dollars)	9,320	10,054	10,011	10,262	10,463	10,667	10,874	11,742	13,163	14,469	17,460
Farm	0.3%	0.0%	0.0%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%
Forestry, Fishing, Related Activities	0.5%	0.5%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Mining	0.2%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
Utilities	2.1%	1.6%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Construction	6.0%	6.6%	6.5%	6.5%	6.5%	6.4%	6.3%	6.1%	5.7%	5.5%	4.9%
Manufacturing	15.4%	17.2%	18.0%	17.6%	17.4%	17.2%	17.0%	16.1%	14.9%	13.9%	12.0%
Wholesale Trade	1.6%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.6%	1.6%	1.6%
Retail Trade	7.0%	6.1%	6.0%	5.9%	5.9%	5.9%	5.8%	5.6%	5.3%	5.1%	4.6%
Transportation and Warehousing	2.3%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.2%	2.2%	2.2%
Information	1.4%	1.0%	0.9%	0.9%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%
Finance and Insurance	2.2%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.5%	2.5%	2.5%	2.5%
Real Estate/Rental and Lease	1.0%	0.8%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	1.0%
Professional and Technical Services	4.6%	5.7%	6.0%	6.0%	6.1%	6.2%	6.3%	6.6%	7.1%	7.6%	8.6%
Management	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.8%
Administrative and Waste Services	3.1%	3.5%	3.6%	3.6%	3.7%	3.8%	3.8%	4.1%	4.5%	4.9%	5.7%
Educational Services	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.5%	0.6%	0.7%	1.1%
Health Care and Social Assistance	6.7%	6.7%	6.7%	6.8%	6.8%	6.9%	7.0%	7.4%	7.9%	8.4%	9.4%
Arts, Entertainment, and Recreation	1.5%	1.0%	0.8%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%
Accommodation and Food Services	8.0%	5.8%	5.7%	5.6%	5.6%	5.6%	5.6%	5.5%	5.4%	5.2%	5.0%
Other Services, Except Public Administration	3.3%	3.0%	2.9%	3.0%	3.0%	3.0%	3.1%	3.2%	3.4%	3.5%	3.8%
Federal Civilian Government	8.4%	8.4%	8.0%	8.0%	8.0%	8.0%	8.0%	7.9%	7.8%	7.7%	7.6%
Federal Military	10.2%	9.6%	9.5%	9.6%	9.6%	9.6%	9.6%	9.7%	9.7%	9.7%	9.8%
State and Local Government	13.2%	14.7%	14.5%	14.4%	14.5%	14.5%	14.5%	14.7%	14.8%	15.0%	15.1%
Total Personal Income per Capita (in 2005 dollars)	27,439	30,299	30,763	30,916	31,102	31,401	31,771	33,599	36,930	40,183	47,993
Woods & Poole Economics Wealth Index (U.S. = 100)	67.8	74.3	73.8	74.0	74.0	74.0	74.0	73.9	73.7	73.4	72.8
Persons per Household (in number of people)	2.6	2.7	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7
Mean Household Total Personal Income (in 2005 dollars)	72,261	80,860	81,772	81,818	81,940	82,321	82,911	86,829	95,620	104,891	127,583
Number of Households (in thousands)	183.59	180.70	182.45	184.36	186.32	188.40	190.44	197.21	204.36	208.88	217.10
Income <$10,000 (thousands of households, 2000$)	10.9%	9.6%	9.3%	9.2%	9.1%	8.9%	8.8%	8.0%	6.7%	5.7%	4.1%
Income $10,000 to $19,999	13.3%	11.7%	11.4%	11.2%	11.1%	10.9%	10.8%	9.8%	8.2%	7.0%	5.1%
Income $20,000 to $29,999	13.9%	12.1%	11.8%	11.6%	11.4%	11.3%	11.1%	10.1%	8.4%	7.2%	5.2%

Table 4-15. Demographic and Employment Baseline Projections for Economic Impact Area MS-1 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Income $30,000 to $44,999	20.5%	18.9%	18.6%	18.4%	18.2%	17.9%	17.7%	16.2%	13.5%	11.5%	8.3%
Income $45,000 to $59,999	15.7%	18.0%	18.3%	18.6%	18.8%	19.0%	19.2%	20.2%	20.1%	18.4%	13.5%
Income $60,000 to $74,999	10.2%	11.9%	12.2%	12.4%	12.6%	12.8%	12.9%	14.3%	17.2%	19.9%	21.2%
Income $75,000 to $99,999	8.5%	9.9%	10.1%	10.3%	10.4%	10.6%	10.7%	11.8%	14.3%	16.8%	23.6%
Income $100,000 or more	6.9%	8.0%	8.2%	8.3%	8.5%	8.6%	8.7%	9.6%	11.5%	13.6%	19.0%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the counties in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-16

Demographic and Employment Baseline Projections for Economic Impact Area AL-1

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	692.65	725.94	731.91	738.17	744.54	750.98	757.47	783.98	824.55	858.15	924.76
Age Under 19 Years	28.1%	27.2%	27.0%	26.8%	26.7%	26.6%	26.5%	26.4%	26.1%	25.7%	24.8%
Age 20 to 34	18.9%	18.6%	18.6%	18.7%	18.6%	18.5%	18.4%	17.6%	16.9%	16.5%	17.0%
Age 35 to 49	21.4%	19.8%	19.5%	19.2%	19.0%	18.8%	18.6%	18.6%	18.6%	18.6%	17.6%
Age 50 to 64	18.2%	20.0%	20.3%	20.3%	20.4%	20.4%	20.4%	19.8%	18.4%	17.6%	18.2%
Age 65 and over	13.4%	14.4%	14.6%	15.0%	15.4%	15.7%	16.1%	17.5%	20.0%	21.5%	22.4%
Median Age of Population (years)	38.0	39.8	40.1	40.3	40.5	40.6	40.8	41.4	42.5	43.2	44.3
White Population (in thousands)	66.3%	65.4%	65.3%	65.2%	65.1%	65.0%	64.9%	64.4%	63.6%	62.9%	61.7%
Black Population (in thousands)	29.7%	29.5%	29.5%	29.5%	29.6%	29.6%	29.6%	29.7%	29.9%	30.1%	30.2%
Native American Population (in thousands)	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.2%
Asian and Pacific Islander Population (in thousands)	1.2%	1.3%	1.3%	1.4%	1.4%	1.4%	1.4%	1.5%	1.6%	1.7%	2.0%
Hispanic or Latino Population (in thousands)	1.8%	2.7%	2.8%	2.8%	2.9%	2.9%	3.0%	3.2%	3.7%	4.1%	5.0%
Male Population (in thousands)	48.3%	48.5%	48.5%	48.5%	48.5%	48.5%	48.5%	48.6%	48.7%	48.7%	48.7%
Total Employment (in thousands of jobs)	363.84	369.87	373.47	378.59	384.36	390.18	396.12	420.72	460.50	496.54	577.46
Farm Employment	1.4%	1.5%	1.4%	1.4%	1.4%	1.4%	1.4%	1.3%	1.2%	1.1%	0.9%
Forestry, Fishing, Related Activities	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.8%	0.8%	0.7%
Mining	0.3%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%	0.5%	0.4%
Utilities	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
Construction	8.5%	7.8%	7.2%	7.1%	7.1%	7.1%	7.1%	7.0%	6.8%	6.6%	6.3%
Manufacturing	8.7%	7.1%	7.0%	6.9%	6.8%	6.6%	6.5%	5.9%	5.2%	4.6%	3.7%
Wholesale Trade	3.5%	3.3%	3.4%	3.3%	3.3%	3.3%	3.3%	3.1%	3.0%	2.8%	2.5%
Retail Trade	12.4%	11.8%	11.9%	11.9%	11.8%	11.7%	11.7%	11.4%	11.1%	10.7%	10.0%
Transportation and Warehousing	3.7%	3.6%	3.6%	3.6%	3.5%	3.5%	3.5%	3.4%	3.2%	3.1%	2.8%
Information Employment	1.3%	1.0%	1.0%	1.0%	1.0%	1.0%	1.0%	0.9%	0.9%	0.8%	0.8%
Finance and Insurance	3.4%	4.2%	4.4%	4.4%	4.4%	4.4%	4.5%	4.6%	4.7%	4.8%	4.9%
Real Estate/Rental and Lease	4.4%	4.7%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.8%	4.7%	4.6%
Professional and Technical Services	4.4%	4.6%	4.6%	4.6%	4.7%	4.7%	4.7%	4.8%	4.9%	5.0%	5.1%
Management	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%	0.4%
Administrative and Waste Services	6.4%	6.9%	7.2%	7.3%	7.4%	7.5%	7.6%	8.1%	8.8%	9.5%	10.8%
Educational Services	1.4%	1.7%	1.7%	1.7%	1.7%	1.8%	1.8%	1.9%	2.0%	2.1%	2.4%
Health Care and Social Assistance	8.5%	9.2%	9.2%	9.3%	9.4%	9.5%	9.6%	10.0%	10.6%	11.1%	12.1%
Arts, Entertainment, and Recreation	1.3%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Accommodation and Food Services	6.8%	7.6%	7.8%	7.9%	8.0%	8.0%	8.1%	8.4%	8.8%	9.1%	9.8%

Table 4-16. Demographic and Employment Baseline Projections for Economic Impact Area AL-1 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Other Services, Except Public Administration	7.7%	8.0%	8.0%	8.1%	8.1%	8.2%	8.3%	8.5%	8.9%	9.1%	9.7%
Federal Civilian Government	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.8%	0.8%	0.7%	0.6%
Federal Military	1.3%	1.2%	1.2%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	0.9%	0.8%
State and Local Government	12.0%	11.5%	11.3%	11.2%	11.1%	11.0%	11.0%	10.7%	10.2%	9.8%	9.1%
Total Earnings (in millions of 2005 dollars)	12,929	13,356	13,406	13,645	13,958	14,279	14,606	15,991	18,316	20,507	25,712
Farm	0.8%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%
Forestry, Fishing, Related Activities	1.0%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.8%	0.8%	0.7%
Mining	0.4%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%	0.5%
Utilities	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.8%	0.8%	0.7%
Construction	8.9%	7.8%	7.0%	7.0%	6.9%	6.9%	6.8%	6.6%	6.2%	5.9%	5.2%
Manufacturing	13.6%	12.1%	12.3%	12.1%	12.0%	11.8%	11.7%	11.1%	10.2%	9.5%	8.1%
Wholesale Trade	5.1%	5.0%	5.2%	5.2%	5.2%	5.1%	5.1%	5.0%	4.8%	4.6%	4.3%
Retail Trade	8.9%	8.1%	8.1%	8.0%	7.9%	7.9%	7.8%	7.4%	6.8%	6.4%	5.5%
Transportation and Warehousing	4.8%	5.0%	5.0%	4.9%	4.9%	4.8%	4.8%	4.6%	4.3%	4.1%	3.6%
Information	1.6%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%	1.2%
Finance and Insurance	4.9%	5.7%	6.4%	6.5%	6.5%	6.6%	6.7%	6.9%	7.2%	7.5%	8.0%
Real Estate/Rental and Lease	2.3%	1.7%	1.8%	1.8%	1.8%	1.8%	1.8%	1.8%	1.7%	1.7%	1.7%
Professional and Technical Services	5.5%	6.1%	6.0%	6.1%	6.1%	6.2%	6.3%	6.5%	6.9%	7.2%	7.8%
Management	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.5%	0.5%	0.6%	0.8%
Administrative and Waste Services	3.7%	3.9%	4.0%	4.1%	4.2%	4.2%	4.3%	4.6%	5.2%	5.6%	6.6%
Educational Services	0.9%	1.0%	1.0%	1.0%	1.0%	1.1%	1.1%	1.2%	1.3%	1.4%	1.6%
Health Care and Social Assistance	9.9%	11.0%	10.9%	11.0%	11.2%	11.3%	11.5%	12.1%	13.0%	13.7%	15.3%
Arts, Entertainment, and Recreation	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Accommodation and Food Services	3.2%	3.4%	3.5%	3.6%	3.6%	3.6%	3.7%	3.8%	4.0%	4.2%	4.6%
Other Services, Except Public Administration	4.8%	4.9%	4.9%	5.0%	5.0%	5.0%	5.1%	5.2%	5.5%	5.6%	6.0%
Federal Civilian Government	2.2%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.4%	2.3%	2.3%	2.2%
Federal Military	1.8%	1.9%	1.9%	1.5%	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%	1.6%
State and Local Government	13.8%	14.9%	14.6%	14.6%	14.6%	14.5%	14.5%	14.4%	14.1%	13.9%	13.3%
Total Personal Income per Capita (in 2005 dollars)	26,923	28,692	29,258	29,222	29,448	29,779	30,177	32,106	35,612	39,054	47,421
Woods & Poole Economics Wealth Index (U.S. = 100)	68.7	70.9	71.0	70.8	71.0	71.1	71.3	71.7	72.2	72.6	73.1
Persons per Household (in number of people)	2.5	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6
Mean Household Total Personal Income (in 2005 dollars)	68,479	73,703	74,889	74,479	74,731	75,212	75,880	79,999	88,990	98,466	121,943
Number of Households (in thousands)	272.33	282.60	285.94	289.62	293.39	297.34	301.24	314.63	329.97	340.36	359.62
Income <$10,000 (thousands of households, 2000$)	13.4%	11.8%	11.5%	11.3%	11.2%	11.0%	10.8%	9.7%	8.0%	6.8%	4.8%
Income $10,000 to $19,999	14.6%	13.1%	12.8%	12.6%	12.4%	12.2%	12.1%	10.9%	9.1%	7.8%	5.6%
Income $20,000 to $29,999	13.1%	11.8%	11.6%	11.4%	11.3%	11.1%	11.0%	9.9%	8.4%	7.2%	5.1%

Table 4-16. Demographic and Employment Baseline Projections for Economic Impact Area AL-1 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Income $30,000 to $44,999	18.8%	18.4%	18.2%	18.0%	17.9%	17.7%	17.5%	16.1%	13.7%	11.8%	8.4%
Income $45,000 to $59,999	14.8%	16.5%	16.9%	17.1%	17.3%	17.5%	17.8%	19.0%	19.6%	18.1%	13.4%
Income $60,000 to $74,999	9.5%	10.6%	10.9%	11.1%	11.2%	11.4%	11.6%	12.8%	15.4%	17.9%	19.1%
Income $75,000 to $99,999	8.3%	9.3%	9.5%	9.7%	9.8%	10.0%	10.1%	11.3%	13.5%	15.9%	22.6%
Income $100,000 or more	7.5%	8.4%	8.6%	8.7%	8.9%	9.0%	9.2%	10.2%	12.3%	14.5%	21.0%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the counties in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-17

Demographic and Employment Baseline Projections for Economic Impact Area FL-1

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	861.80	882.64	894.95	907.59	920.37	933.24	946.15	998.49	1,078.03	1,144.07	1,275.33
Age Under 19 Years	26.2%	25.0%	24.7%	24.5%	24.4%	24.4%	24.4%	24.7%	24.9%	24.7%	24.0%
Age 20 to 34	20.2%	20.4%	20.8%	21.0%	21.0%	20.9%	20.7%	19.7%	17.8%	17.4%	18.6%
Age 35 to 49	22.5%	20.2%	19.6%	19.1%	18.6%	18.2%	18.0%	18.2%	19.3%	19.8%	17.3%
Age 50 to 64	18.0%	20.0%	20.4%	20.6%	20.6%	20.8%	20.8%	20.2%	18.0%	16.2%	17.7%
Age 65 and over	13.1%	14.3%	14.5%	14.9%	15.4%	15.7%	16.1%	17.3%	19.9%	21.9%	22.2%
Median Age of Population (years)	39.4	40.3	40.4	40.5	40.6	40.6	40.6	40.8	41.5	42.2	42.2
White Population (in thousands)	79.4%	78.0%	77.8%	77.6%	77.4%	77.2%	77.0%	76.2%	74.9%	73.7%	71.3%
Black Population (in thousands)	13.5%	13.8%	13.8%	13.8%	13.9%	13.9%	14.0%	14.2%	14.4%	14.6%	15.0%
Native American Population (in thousands)	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%	0.5%
Asian and Pacific Islander Population (in thousands)	2.4%	2.4%	2.4%	2.4%	2.5%	2.5%	2.5%	2.5%	2.5%	2.4%	2.2%
Hispanic or Latino Population (in thousands)	3.9%	5.1%	5.3%	5.4%	5.6%	5.7%	5.9%	6.5%	7.6%	8.7%	11.0%
Male Population (in thousands)	49.9%	50.2%	50.2%	50.3%	50.3%	50.4%	50.4%	50.5%	50.8%	50.9%	51.3%
Total Employment (in thousands of jobs)	487.45	475.97	478.36	484.81	491.97	499.21	506.56	536.85	585.25	628.44	723.31
Farm Employment	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%
Forestry, Fishing, Related Activities	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Mining	0.2%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%
Utilities	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%
Construction	9.0%	6.1%	5.7%	5.7%	5.7%	5.7%	5.6%	5.6%	5.4%	5.3%	5.1%
Manufacturing	3.4%	2.9%	2.8%	2.8%	2.7%	2.6%	2.6%	2.4%	2.0%	1.8%	1.4%
Wholesale Trade	2.6%	2.3%	2.2%	2.2%	2.2%	2.2%	2.2%	2.1%	2.0%	2.0%	1.8%
Retail Trade	12.0%	11.9%	12.1%	12.1%	12.1%	12.1%	12.0%	12.0%	11.8%	11.7%	11.3%
Transportation and Warehousing	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%	1.9%	1.9%	1.9%	2.0%	2.0%
Information Employment	1.9%	1.6%	1.7%	1.7%	1.7%	1.6%	1.6%	1.6%	1.5%	1.5%	1.4%
Finance and Insurance	3.6%	4.3%	4.3%	4.4%	4.4%	4.4%	4.4%	4.5%	4.7%	4.8%	5.1%
Real Estate/Rental and Lease	5.5%	5.0%	5.1%	5.1%	5.1%	5.1%	5.1%	5.1%	5.2%	5.2%	5.3%
Professional and Technical Services	5.2%	5.8%	5.9%	5.9%	6.0%	6.1%	6.1%	6.4%	6.8%	7.2%	8.0%
Management	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Administrative and Waste Services	7.0%	6.7%	6.8%	6.9%	7.0%	7.0%	7.1%	7.3%	7.7%	8.0%	8.6%
Educational Services	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.3%
Health Care and Social Assistance	8.9%	10.0%	9.9%	9.9%	10.0%	10.0%	10.1%	10.3%	10.5%	10.8%	11.2%
Arts, Entertainment, and Recreation	1.7%	2.0%	2.1%	2.1%	2.1%	2.1%	2.2%	2.2%	2.3%	2.4%	2.6%
Accommodation and Food Services	8.8%	10.1%	10.6%	10.6%	10.7%	10.7%	10.8%	10.9%	11.2%	11.3%	11.7%

Table 4-17. Demographic and Employment Baseline Projections for Economic Impact Area FL-1 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Other Services, Except Public Administration	6.2%	6.3%	6.2%	6.2%	6.2%	6.3%	6.3%	6.4%	6.5%	6.6%	6.8%
Federal Civilian Government	3.5%	3.6%	3.6%	3.6%	3.6%	3.5%	3.5%	3.3%	3.1%	3.0%	2.6%
Federal Military	6.9%	7.0%	6.9%	6.8%	6.7%	6.6%	6.5%	6.2%	5.7%	5.3%	4.6%
State and Local Government	9.1%	9.3%	8.9%	8.9%	8.8%	8.8%	8.7%	8.5%	8.2%	7.9%	7.4%
Total Earnings (in millions of 2005 dollars)	19,145	18,966	19,160	19,669	20,150	20,642	21,146	23,280	26,873	30,269	38,353
Farm	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Forestry, Fishing, Related Activities	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Mining	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%
Utilities	0.5%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.5%	0.5%
Construction	8.1%	5.0%	4.6%	4.6%	4.5%	4.5%	4.4%	4.2%	3.9%	3.7%	3.3%
Manufacturing	4.8%	4.4%	4.4%	4.3%	4.2%	4.2%	4.1%	3.8%	3.5%	3.2%	2.6%
Wholesale Trade	3.0%	2.7%	2.7%	2.6%	2.6%	2.6%	2.6%	2.5%	2.5%	2.4%	2.3%
Retail Trade	7.9%	7.2%	7.5%	7.3%	7.3%	7.2%	7.1%	6.8%	6.3%	6.0%	5.2%
Transportation and Warehousing	1.8%	2.0%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.1%	2.0%	2.0%
Information	2.4%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.1%	2.1%
Finance and Insurance	3.9%	3.9%	4.1%	4.1%	4.1%	4.1%	4.2%	4.3%	4.5%	4.6%	4.9%
Real Estate/Rental and Lease	3.1%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%
Professional and Technical Services	6.6%	7.9%	8.6%	8.7%	8.8%	9.0%	9.1%	9.7%	10.7%	11.5%	13.3%
Management	0.8%	0.8%	0.9%	0.9%	0.9%	0.9%	0.9%	1.0%	1.1%	1.1%	1.2%
Administrative and Waste Services	4.5%	4.3%	4.6%	4.7%	4.7%	4.8%	4.9%	5.1%	5.4%	5.7%	6.3%
Educational Services	0.7%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.6%	0.7%
Health Care and Social Assistance	10.0%	11.2%	11.2%	11.2%	11.3%	11.3%	11.4%	11.6%	12.0%	12.3%	12.8%
Arts, Entertainment, and Recreation	0.6%	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.8%
Accommodation and Food Services	4.6%	4.9%	5.2%	5.2%	5.2%	5.3%	5.3%	5.3%	5.4%	5.5%	5.6%
Other Services, Except Public Administration	4.4%	4.1%	4.1%	4.1%	4.1%	4.2%	4.2%	4.2%	4.2%	4.3%	4.3%
Federal Civilian Government	6.8%	7.7%	7.2%	7.2%	7.1%	7.1%	7.1%	6.9%	6.7%	6.5%	6.1%
Federal Military	14.5%	16.8%	16.5%	16.6%	16.5%	16.5%	16.4%	16.1%	15.7%	15.4%	14.7%
State and Local Government	10.5%	10.8%	10.2%	10.2%	10.1%	10.1%	10.1%	9.9%	9.7%	9.5%	9.0%
Total Personal Income per Capita (in 2005 dollars)	31,073	32,887	33,322	33,192	33,305	33,561	33,905	35,709	39,118	42,516	50,840
Woods & Poole Economics Wealth Index (U.S. = 100)	85.9	87.7	87.1	86.7	86.5	86.4	86.4	86.3	86.3	86.4	86.7
Persons per Household (in number of people)	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.6
Mean Household Total Personal Income (in 2005 dollars)	78,593	83,780	84,588	83,933	83,877	84,141	84,654	88,455	97,347	106,910	130,791
Number of Households (in thousands)	340.73	346.48	352.55	358.91	365.45	372.23	378.94	403.09	433.20	454.98	495.74
Income <$10,000 (thousands of households, 2000$)	8.6%	7.7%	7.5%	7.4%	7.3%	7.2%	7.1%	6.4%	5.4%	4.6%	3.3%
Income $10,000 to $19,999	12.3%	11.0%	10.7%	10.6%	10.5%	10.3%	10.2%	9.2%	7.7%	6.7%	4.8%
Income $20,000 to $29,999	13.7%	12.2%	11.9%	11.8%	11.7%	11.5%	11.3%	10.3%	8.6%	7.4%	5.3%

Table 4-17. Demographic and Employment Baseline Projections for Economic Impact Area FL-1 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Income $30,000 to $44,999	19.6%	18.1%	17.7%	17.6%	17.3%	17.1%	16.9%	15.3%	12.9%	11.1%	7.9%
Income $45,000 to $59,999	16.6%	18.3%	18.6%	18.8%	18.9%	19.1%	19.2%	19.7%	18.6%	16.4%	11.8%
Income $60,000 to $74,999	11.3%	12.7%	13.0%	13.1%	13.3%	13.5%	13.7%	15.1%	18.1%	20.4%	19.8%
Income $75,000 to $99,999	9.3%	10.3%	10.6%	10.7%	10.8%	11.0%	11.1%	12.3%	14.8%	17.2%	24.1%
Income $100,000 or more	8.7%	9.7%	10.0%	10.1%	10.2%	10.4%	10.5%	11.6%	14.0%	16.3%	23.0%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the counties in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-18

Demographic and Employment Baseline Projections for Economic Impact Area FL-2

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	619.13	660.01	667.83	675.90	684.08	692.32	700.61	734.26	785.55	828.12	912.75
Age Under 19 Years	25.5%	25.1%	24.3%	23.9%	23.8%	23.8%	23.9%	24.2%	24.1%	23.9%	23.3%
Age 20 to 34	24.4%	23.9%	24.6%	24.8%	24.6%	24.3%	23.9%	22.1%	19.7%	19.1%	19.8%
Age 35 to 49	21.0%	19.1%	18.8%	18.5%	18.3%	18.2%	18.1%	18.9%	20.7%	21.2%	17.8%
Age 50 to 64	17.5%	19.2%	19.4%	19.3%	19.3%	19.3%	19.3%	18.4%	16.8%	16.1%	19.0%
Age 65 and over	11.7%	12.7%	13.0%	13.5%	13.9%	14.4%	14.8%	16.4%	18.5%	19.7%	20.1%
Median Age of Population (years)	37.9	39.2	39.4	39.7	39.8	40.0	40.2	40.7	41.7	42.6	43.0
White Population (in thousands)	66.7%	65.5%	65.2%	65.0%	64.7%	64.5%	64.2%	63.2%	61.5%	60.1%	57.5%
Black Population (in thousands)	26.8%	26.9%	27.0%	27.2%	27.3%	27.5%	27.6%	28.2%	29.1%	29.9%	31.4%
Native American Population (in thousands)	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
Asian and Pacific Islander Population (in thousands)	1.4%	1.6%	1.6%	1.6%	1.6%	1.7%	1.7%	1.8%	1.9%	1.9%	2.0%
Hispanic or Latino Population (in thousands)	4.6%	5.6%	5.7%	5.8%	5.9%	6.0%	6.1%	6.5%	7.1%	7.7%	8.7%
Male Population (in thousands)	50.4%	50.9%	51.0%	51.0%	51.1%	51.2%	51.2%	51.4%	51.6%	51.7%	51.9%
Total Employment (in thousands of jobs)	322.62	317.69	314.73	318.31	322.52	326.77	331.07	348.86	377.27	402.75	459.46
Farm Employment	2.6%	2.8%	2.8%	2.7%	2.7%	2.7%	2.6%	2.5%	2.3%	2.1%	1.9%
Forestry, Fishing, Related Activities	1.3%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%
Mining	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Utilities	0.4%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Construction	6.5%	4.7%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.3%	4.3%	4.2%
Manufacturing	4.6%	3.7%	3.6%	3.6%	3.6%	3.5%	3.5%	3.3%	3.0%	2.8%	2.4%
Wholesale Trade	2.1%	2.0%	2.0%	2.0%	2.0%	2.0%	1.9%	1.9%	1.8%	1.7%	1.6%
Retail Trade	11.0%	10.3%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.4%	10.2%
Transportation and Warehousing	1.6%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.4%
Information Employment	1.8%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.4%	1.4%	1.3%
Finance and Insurance	3.2%	3.8%	3.9%	3.9%	3.9%	3.9%	3.9%	3.8%	3.8%	3.7%	3.6%
Real Estate/Rental and Lease	3.1%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.8%	2.8%	2.6%
Professional and Technical Services	5.8%	6.4%	6.7%	6.8%	6.9%	6.9%	7.0%	7.4%	7.9%	8.3%	9.1%
Management	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.4%	0.4%
Administrative and Waste Services	4.8%	5.0%	5.2%	5.2%	5.2%	5.3%	5.3%	5.4%	5.6%	5.8%	6.2%
Educational Services	1.1%	1.5%	1.5%	1.5%	1.6%	1.6%	1.7%	1.9%	2.3%	2.6%	3.5%
Health Care and Social Assistance	8.6%	9.8%	9.8%	9.8%	9.9%	10.0%	10.0%	10.3%	10.6%	10.9%	11.4%
Arts, Entertainment, and Recreation	1.2%	1.4%	1.5%	1.5%	1.5%	1.5%	1.6%	1.6%	1.7%	1.8%	1.9%
Accommodation and Food Services	6.6%	7.4%	7.6%	7.6%	7.7%	7.8%	7.8%	8.1%	8.4%	8.7%	9.3%

Table 4-18. Demographic and Employment Baseline Projections for Economic Impact Area FL-2 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Other Services, Except Public Administration	6.2%	6.1%	6.0%	6.0%	6.0%	6.0%	6.0%	6.0%	5.9%	5.9%	5.8%
Federal Civilian Government	1.2%	1.3%	1.3%	1.2%	1.2%	1.2%	1.2%	1.2%	1.1%	1.0%	0.9%
Federal Military	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
State and Local Government	25.3%	25.3%	24.7%	24.6%	24.4%	24.3%	24.1%	23.5%	22.6%	21.8%	20.2%
Total Earnings (in millions of 2005 dollars)	11,928	11,797	11,847	12,084	12,357	12,636	12,921	14,122	16,124	17,997	22,405
Farm	1.3%	0.8%	0.8%	1.0%	1.0%	0.9%	0.9%	0.9%	0.8%	0.8%	0.7%
Forestry, Fishing, Related Activities	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.4%	1.3%	1.3%
Mining	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%
Utilities	0.8%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Construction	6.4%	4.4%	4.1%	4.0%	4.0%	4.0%	3.9%	3.8%	3.6%	3.4%	3.1%
Manufacturing	5.9%	5.2%	5.2%	5.2%	5.1%	5.1%	5.1%	5.0%	4.8%	4.6%	4.3%
Wholesale Trade	2.7%	2.3%	2.3%	2.4%	2.4%	2.4%	2.3%	2.3%	2.2%	2.1%	2.0%
Retail Trade	7.2%	6.7%	6.9%	6.9%	6.8%	6.8%	6.7%	6.5%	6.1%	5.8%	5.2%
Transportation and Warehousing	1.5%	1.4%	1.5%	1.4%	1.4%	1.4%	1.4%	1.4%	1.3%	1.3%	1.2%
Information	2.4%	2.2%	2.2%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.4%	2.4%
Finance and Insurance	4.2%	4.5%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%	4.6%
Real Estate/Rental and Lease	1.1%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.8%	0.7%	0.7%
Professional and Technical Services	7.9%	8.5%	8.8%	8.9%	9.0%	9.1%	9.3%	9.8%	10.7%	11.4%	13.0%
Management	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.6%	0.6%	0.8%
Administrative and Waste Services	2.8%	2.7%	2.8%	2.8%	2.8%	2.8%	2.9%	3.0%	3.1%	3.3%	3.6%
Educational Services	0.5%	0.7%	0.7%	0.7%	0.7%	0.8%	0.8%	0.9%	1.1%	1.3%	1.8%
Health Care and Social Assistance	9.5%	11.2%	11.3%	11.4%	11.5%	11.5%	11.6%	11.9%	12.3%	12.7%	13.3%
Arts, Entertainment, and Recreation	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.5%	0.5%	0.5%
Accommodation and Food Services	2.7%	3.0%	3.2%	3.2%	3.2%	3.2%	3.3%	3.4%	3.5%	3.6%	3.9%
Other Services, Except Public Administration	5.2%	5.0%	4.9%	4.9%	4.9%	4.9%	4.9%	4.8%	4.8%	4.7%	4.6%
Federal Civilian Government	2.7%	3.1%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.9%	2.8%	2.7%
Federal Military	0.5%	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
State and Local Government	32.3%	33.9%	33.2%	33.1%	33.0%	32.9%	32.8%	32.3%	31.5%	30.8%	29.3%
Total Personal Income per Capita (in 2005 dollars)	26,967	27,328	27,699	27,633	27,735	27,943	28,216	29,624	32,258	34,871	41,243
Woods & Poole Economics Wealth Index (U.S. = 100)	66.4	66.7	66.6	66.7	66.7	66.6	66.5	66.2	65.8	65.4	64.7
Persons per Household (in number of people)	2.6	2.7	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7
Mean Household Total Personal Income (in 2005 dollars)	70,426	72,591	73,342	72,882	72,869	73,092	73,512	76,590	83,807	91,537	110,692
Number of Households (in thousands)	237.07	248.47	252.22	256.26	260.38	264.68	268.91	284.00	302.36	315.47	340.09
Income <$10,000 (thousands of households, 2000$)	13.7%	12.5%	12.2%	12.1%	11.9%	11.7%	11.6%	10.8%	9.1%	7.9%	5.9%
Income $10,000 to $19,999	14.3%	13.1%	12.8%	12.7%	12.5%	12.3%	12.1%	11.3%	9.5%	8.2%	6.1%
Income $20,000 to $29,999	13.9%	12.7%	12.5%	12.3%	12.2%	12.0%	11.8%	11.0%	9.3%	8.0%	6.0%

Table 4-18. Demographic and Employment Baseline Projections for Economic Impact Area FL-2 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Income $30,000 to $44,999	18.7%	18.6%	18.5%	18.4%	18.3%	18.2%	18.1%	17.4%	14.9%	12.8%	9.4%
Income $45,000 to $59,999	14.1%	15.5%	15.8%	16.0%	16.2%	16.5%	16.7%	17.7%	19.4%	19.2%	15.4%
Income $60,000 to $74,999	9.3%	10.2%	10.4%	10.6%	10.7%	10.9%	11.0%	11.8%	14.1%	16.4%	20.2%
Income $75,000 to $99,999	8.1%	8.9%	9.1%	9.2%	9.3%	9.4%	9.6%	10.3%	12.2%	14.2%	19.2%
Income $100,000 or more	7.7%	8.4%	8.6%	8.7%	8.8%	9.0%	9.1%	9.7%	11.5%	13.3%	17.8%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the counties in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-19

Demographic and Employment Baseline Projections for Economic Impact Area FL-3

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	3,435.22	3,627.12	3,688.14	3,750.54	3,813.50	3,876.76	3,940.23	4,196.90	4,586.14	4,909.33	5,552.03
Age Under 19 Years	24.1%	23.3%	23.1%	23.0%	22.9%	22.9%	22.9%	23.0%	23.1%	23.2%	23.4%
Age 20 to 34	18.5%	18.5%	18.8%	19.0%	19.1%	19.2%	19.1%	18.9%	18.3%	18.0%	18.5%
Age 35 to 49	21.4%	19.9%	19.5%	19.0%	18.7%	18.4%	18.1%	17.8%	18.1%	18.6%	18.0%
Age 50 to 64	18.5%	20.1%	20.4%	20.4%	20.4%	20.4%	20.5%	19.9%	18.3%	16.7%	16.7%
Age 65 and over	17.5%	18.1%	18.2%	18.6%	18.9%	19.2%	19.4%	20.4%	22.3%	23.5%	23.4%
Median Age of Population (years)	41.5	42.9	43.0	43.2	43.3	43.5	43.6	43.9	43.9	44.0	43.7
White Population (in thousands)	74.3%	70.6%	70.0%	69.4%	68.9%	68.3%	67.8%	65.5%	62.2%	59.3%	53.4%
Black Population (in thousands)	11.3%	11.9%	12.0%	12.1%	12.1%	12.2%	12.3%	12.6%	13.0%	13.3%	13.9%
Native American Population (in thousands)	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Asian and Pacific Islander Population (in thousands)	2.4%	2.9%	3.0%	3.0%	3.1%	3.2%	3.2%	3.5%	3.9%	4.3%	5.0%
Hispanic or Latino Population (in thousands)	11.7%	14.4%	14.8%	15.2%	15.6%	16.1%	16.5%	18.1%	20.7%	22.9%	27.5%
Male Population (in thousands)	48.6%	48.6%	48.6%	48.6%	48.7%	48.7%	48.8%	48.9%	49.1%	49.1%	49.2%
Total Employment (in thousands of jobs)	1,944.15	1,836.01	1,837.13	1,865.09	1,897.15	1,929.67	1,962.67	2,099.53	2,320.20	2,519.25	2,962.99
Farm Employment	1.0%	1.1%	1.1%	1.1%	1.1%	1.1%	1.1%	1.0%	1.0%	0.9%	0.8%
Forestry, Fishing, Related Activities	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%
Mining	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%
Utilities	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%	0.3%	0.3%
Construction	7.3%	5.0%	4.7%	4.8%	4.8%	4.8%	4.8%	5.0%	5.1%	5.2%	5.5%
Manufacturing	5.0%	4.2%	4.2%	4.1%	4.1%	4.0%	3.9%	3.7%	3.4%	3.1%	2.7%
Wholesale Trade	3.4%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.3%	3.2%	3.2%	3.1%
Retail Trade	11.4%	11.2%	11.3%	11.3%	11.3%	11.3%	11.4%	11.5%	11.6%	11.7%	11.8%
Transportation and Warehousing	2.3%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%	2.2%
Information Employment	2.2%	2.0%	2.0%	2.0%	2.0%	2.0%	1.9%	1.9%	1.8%	1.7%	1.6%
Finance and Insurance	5.8%	6.9%	6.9%	6.9%	6.9%	6.8%	6.8%	6.7%	6.5%	6.4%	6.0%
Real Estate/Rental and Lease	4.5%	4.3%	4.4%	4.4%	4.4%	4.3%	4.3%	4.2%	4.1%	3.9%	3.7%
Professional and Technical Services	6.4%	7.4%	7.6%	7.6%	7.6%	7.6%	7.7%	7.7%	7.8%	7.8%	7.9%
Management	0.8%	1.1%	1.2%	1.2%	1.2%	1.2%	1.2%	1.3%	1.3%	1.4%	1.5%
Administrative and Waste Services	10.8%	7.8%	7.7%	7.8%	7.9%	8.0%	8.1%	8.6%	9.2%	9.9%	11.2%
Educational Services	1.3%	1.7%	1.6%	1.7%	1.7%	1.7%	1.7%	1.8%	1.9%	2.0%	2.2%
Health Care and Social Assistance	10.3%	12.1%	12.1%	12.1%	12.2%	12.2%	12.2%	12.4%	12.6%	12.7%	12.9%
Arts, Entertainment, and Recreation	2.0%	2.5%	2.7%	2.7%	2.7%	2.8%	2.8%	2.8%	2.9%	3.0%	3.2%

Table 4-19. Demographic and Employment Baseline Projections for Economic Impact Area FL-3 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Accommodation and Food Services	6.8%	7.5%	7.6%	7.6%	7.5%	7.5%	7.5%	7.4%	7.2%	7.1%	6.8%
Other Services, Except Public Administration	5.9%	5.9%	5.7%	5.7%	5.7%	5.7%	5.7%	5.8%	5.9%	5.9%	6.0%
Federal Civilian Government	1.3%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.4%	1.4%	1.3%	1.2%
Federal Military	0.7%	0.8%	0.8%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.5%
State and Local Government	9.9%	10.5%	10.3%	10.2%	10.1%	10.1%	10.0%	9.7%	9.3%	9.0%	8.3%
Total Earnings (in millions of 2005 dollars)	79,115	75,732	76,230	78,164	80,283	82,456	84,684	94,161	110,241	125,561	162,390
Farm	0.5%	0.3%	0.3%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%	0.3%
Forestry, Fishing, Related Activities	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.2%	0.2%	0.2%
Mining	0.3%	0.4%	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.6%	0.6%	0.7%
Utilities	0.9%	1.0%	1.0%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.8%
Construction	7.5%	5.0%	4.6%	4.6%	4.6%	4.6%	4.6%	4.5%	4.4%	4.4%	4.2%
Manufacturing	6.8%	6.1%	5.9%	5.9%	5.9%	5.8%	5.8%	5.6%	5.3%	5.0%	4.5%
Wholesale Trade	4.9%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%	4.7%
Retail Trade	8.3%	7.5%	7.5%	7.5%	7.4%	7.4%	7.3%	7.1%	6.8%	6.5%	6.0%
Transportation and Warehousing	2.3%	2.0%	2.0%	2.0%	1.9%	1.9%	1.9%	1.9%	1.8%	1.8%	1.7%
Information	3.3%	3.1%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.2%	3.1%
Finance and Insurance	8.0%	7.8%	8.0%	8.0%	8.0%	8.0%	7.9%	7.8%	7.6%	7.4%	7.1%
Real Estate/Rental and Lease	2.3%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.5%	1.5%	1.4%	1.3%
Professional and Technical Services	8.1%	9.7%	10.1%	10.2%	10.2%	10.3%	10.3%	10.5%	10.8%	11.0%	11.4%
Management	1.6%	2.3%	2.5%	2.6%	2.6%	2.7%	2.7%	2.9%	3.3%	3.6%	4.3%
Administrative and Waste Services	7.1%	5.0%	5.0%	5.1%	5.2%	5.2%	5.3%	5.7%	6.2%	6.7%	7.8%
Educational Services	0.8%	1.1%	1.1%	1.1%	1.1%	1.1%	1.2%	1.2%	1.3%	1.4%	1.6%
Health Care and Social Assistance	12.1%	14.4%	14.4%	14.4%	14.5%	14.5%	14.6%	14.8%	15.0%	15.2%	15.5%
Arts, Entertainment, and Recreation	1.5%	1.7%	1.7%	1.7%	1.7%	1.8%	1.8%	1.8%	1.8%	1.9%	1.9%
Accommodation and Food Services	3.9%	4.1%	4.2%	4.2%	4.2%	4.2%	4.2%	4.1%	4.0%	3.9%	3.7%
Other Services, Except Public Administration	4.0%	3.8%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%	3.7%
Federal Civilian Government	2.7%	3.5%	3.4%	3.4%	3.4%	3.4%	3.4%	3.3%	3.3%	3.3%	3.2%
Federal Military	1.2%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%	1.4%	1.4%	1.3%
State and Local Government	11.8%	13.0%	12.6%	12.6%	12.5%	12.4%	12.4%	12.1%	11.8%	11.5%	10.8%
Total Personal Income per Capita (in 2005 dollars)	33,038	33,094	33,458	33,277	33,361	33,603	33,943	35,779	39,308	42,864	51,665
Woods & Poole Economics Wealth Index (U.S. = 100)	78.9	78.5	77.9	78.0	77.9	77.9	77.8	77.8	77.8	78.0	78.4
Persons per Household (in number of people)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.3	2.4	2.4	2.4

Table 4-19. Demographic and Employment Baseline Projections for Economic Impact Area FL-3 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Mean Household Total Personal Income (in 2005 dollars)	78,298	80,154	80,736	79,958	79,810	80,006	80,459	84,037	92,602	101,904	125,355
Number of Households (in thousands)	1,450	1,498	1,528	1,561	1,594	1,628	1,662	1,787	1,947	2,065	2,288
Income <$10,000 (thousands of households, 2000$)	9.0%	8.2%	8.1%	8.0%	7.9%	7.8%	7.6%	7.0%	5.9%	5.1%	3.7%
Income $10,000 to $19,999	13.6%	12.4%	12.2%	12.1%	11.9%	11.8%	11.6%	10.6%	8.9%	7.7%	5.6%
Income $20,000 to $29,999	14.5%	13.3%	13.0%	12.9%	12.7%	12.5%	12.4%	11.3%	9.5%	8.2%	6.0%
Income $30,000 to $44,999	19.6%	18.8%	18.6%	18.5%	18.3%	18.1%	17.9%	16.5%	14.0%	12.1%	8.8%
Income $45,000 to $59,999	15.3%	16.7%	17.0%	17.2%	17.4%	17.6%	17.8%	18.8%	19.3%	18.1%	13.5%
Income $60,000 to $74,999	9.9%	10.8%	11.0%	11.1%	11.3%	11.5%	11.6%	12.8%	15.2%	17.4%	19.2%
Income $75,000 to $99,999	8.5%	9.3%	9.5%	9.6%	9.7%	9.8%	10.0%	10.9%	13.0%	14.9%	20.7%
Income $100,000 or more	9.6%	10.4%	10.6%	10.7%	10.8%	10.9%	11.1%	12.1%	14.3%	16.4%	22.6%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the counties in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-20

Demographic and Employment Baseline Projections for Economic Impact Area FL-4

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Total Population (in thousands)	5,934.95	6,173.13	6,255.79	6,340.82	6,426.81	6,513.36	6,600.26	6,952.71	7,488.55	7,933.26	8,817.05
Age Under 19 Years	24.9%	23.4%	23.3%	23.1%	22.9%	22.8%	22.8%	22.5%	22.3%	22.3%	22.1%
Age 20 to 34	18.3%	18.3%	18.4%	18.5%	18.6%	18.7%	18.7%	18.6%	18.0%	17.5%	17.2%
Age 35 to 49	22.2%	21.1%	20.8%	20.4%	20.0%	19.6%	19.2%	18.5%	18.3%	18.6%	17.9%
Age 50 to 64	17.8%	19.3%	19.5%	19.6%	19.8%	19.9%	20.1%	19.9%	19.0%	17.4%	16.7%
Age 65 and over	16.8%	17.8%	18.0%	18.4%	18.7%	19.0%	19.2%	20.4%	22.4%	24.2%	26.0%
Median Age of Population (years)	43.8	45.4	45.6	45.8	45.9	46.0	46.1	46.4	46.4	46.2	45.8
White Population (in thousands)	46.3%	42.5%	41.9%	41.4%	40.9%	40.3%	39.8%	37.9%	35.1%	32.7%	28.5%
Black Population (in thousands)	16.7%	16.8%	16.9%	16.9%	16.9%	17.0%	17.0%	17.2%	17.4%	17.6%	17.9%
Native American Population (in thousands)	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.1%	0.1%	0.1%
Asian and Pacific Islander Population (in thousands)	1.8%	2.0%	2.0%	2.0%	2.1%	2.1%	2.1%	2.2%	2.4%	2.5%	2.7%
Hispanic or Latino Population (in thousands)	35.1%	38.5%	39.0%	39.5%	40.0%	40.4%	40.9%	42.5%	45.0%	47.0%	50.7%
Male Population (in thousands)	48.6%	48.6%	48.6%	48.6%	48.6%	48.6%	48.6%	48.5%	48.5%	48.4%	48.1%
Total Employment (in thousands of jobs)	3,395.35	3,306.18	3,330.93	3,382.52	3,439.80	3,497.84	3,556.64	3,799.78	4,189.08	4,537.36	5,304.35
Farm Employment	0.6%	0.6%	0.6%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%
Forestry, Fishing, Related Activities	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%
Mining	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.4%
Utilities	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%
Construction	8.0%	5.2%	4.9%	4.9%	4.9%	4.9%	4.9%	5.0%	5.0%	5.1%	5.2%
Manufacturing	3.6%	2.9%	2.8%	2.8%	2.7%	2.7%	2.6%	2.4%	2.1%	1.9%	1.5%
Wholesale Trade	4.5%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.4%	4.3%
Retail Trade	11.2%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.9%	10.8%	10.8%	10.6%
Transportation and Warehousing	3.8%	3.7%	3.8%	3.8%	3.8%	3.8%	3.8%	3.8%	3.7%	3.7%	3.6%
Information Employment	2.0%	1.7%	1.7%	1.7%	1.7%	1.7%	1.7%	1.6%	1.6%	1.5%	1.4%
Finance and Insurance	5.0%	5.9%	5.9%	5.9%	5.9%	5.9%	5.8%	5.7%	5.6%	5.5%	5.2%
Real Estate/Rental and Lease	6.0%	5.6%	5.6%	5.6%	5.6%	5.6%	5.6%	5.5%	5.4%	5.3%	5.1%
Professional and Technical Services	6.5%	6.8%	6.9%	6.9%	6.9%	6.8%	6.8%	6.8%	6.7%	6.7%	6.6%
Management	0.7%	0.8%	0.8%	0.8%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%	0.9%
Administrative and Waste Services	9.0%	7.8%	7.7%	7.8%	7.8%	7.9%	8.0%	8.2%	8.6%	9.0%	9.7%
Educational Services	1.8%	2.4%	2.4%	2.4%	2.5%	2.5%	2.5%	2.7%	2.9%	3.1%	3.6%
Health Care and Social Assistance	9.1%	10.9%	11.0%	11.1%	11.1%	11.2%	11.3%	11.5%	11.9%	12.2%	12.7%
Arts, Entertainment, and Recreation	2.2%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.4%	2.4%	2.4%	2.3%

Table 4-20. Demographic and Employment Baseline Projections for Economic Impact Area FL-4 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Accommodation and Food Services	7.2%	8.3%	8.6%	8.6%	8.6%	8.5%	8.5%	8.4%	8.3%	8.2%	7.9%
Other Services, Except Public Administration	7.7%	8.4%	8.3%	8.4%	8.4%	8.4%	8.5%	8.6%	8.9%	9.0%	9.4%
Federal Civilian Government	1.0%	1.1%	1.1%	1.1%	1.0%	1.0%	1.0%	1.0%	0.9%	0.9%	0.8%
Federal Military	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%	0.4%	0.3%
State and Local Government	9.0%	9.1%	8.7%	8.6%	8.6%	8.6%	8.5%	8.3%	8.1%	7.9%	7.5%
Total Earnings (in millions of 2005 dollars)	146,349	137,031	138,715	142,258	146,050	149,935	153,914	170,817	199,395	226,516	291,324
Farm	0.5%	0.4%	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%
Forestry, Fishing, Related Activities	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%	0.2%
Mining	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.2%
Utilities	0.4%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.5%	0.4%	0.4%
Construction	9.4%	5.7%	5.3%	5.3%	5.3%	5.2%	5.2%	5.1%	4.9%	4.8%	4.5%
Manufacturing	4.4%	3.8%	3.6%	3.6%	3.5%	3.5%	3.4%	3.3%	3.0%	2.8%	2.4%
Wholesale Trade	6.8%	7.0%	7.1%	7.2%	7.2%	7.2%	7.2%	7.3%	7.4%	7.4%	7.5%
Retail Trade	8.5%	8.0%	8.1%	8.0%	7.9%	7.8%	7.8%	7.5%	7.0%	6.7%	6.0%
Transportation and Warehousing	4.0%	4.0%	4.1%	4.1%	4.1%	4.1%	4.1%	4.0%	3.8%	3.7%	3.5%
Information	3.6%	3.4%	3.5%	3.5%	3.5%	3.5%	3.5%	3.5%	3.6%	3.6%	3.7%
Finance and Insurance	6.9%	6.4%	6.4%	6.4%	6.3%	6.3%	6.3%	6.1%	6.0%	5.8%	5.6%
Real Estate/Rental and Lease	3.7%	2.3%	2.3%	2.3%	2.3%	2.3%	2.3%	2.2%	2.2%	2.1%	2.0%
Professional and Technical Services	8.3%	9.5%	9.7%	9.7%	9.7%	9.7%	9.8%	9.9%	10.0%	10.2%	10.4%
Management	1.3%	1.8%	2.0%	2.0%	2.0%	2.1%	2.1%	2.2%	2.4%	2.6%	3.0%
Administrative and Waste Services	6.2%	4.9%	4.8%	4.8%	4.9%	4.9%	5.0%	5.2%	5.5%	5.8%	6.4%
Educational Services	1.5%	2.1%	2.2%	2.2%	2.2%	2.3%	2.3%	2.5%	2.7%	3.0%	3.5%
Health Care and Social Assistance	9.5%	12.0%	12.2%	12.2%	12.3%	12.4%	12.5%	12.8%	13.3%	13.7%	14.5%
Arts, Entertainment, and Recreation	1.6%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.9%	1.8%	1.8%	1.7%
Accommodation and Food Services	4.3%	4.9%	5.2%	5.2%	5.1%	5.1%	5.1%	5.1%	5.0%	4.9%	4.8%
Other Services, Except Public Administration	4.2%	4.5%	4.4%	4.4%	4.4%	4.5%	4.5%	4.5%	4.6%	4.7%	4.8%
Federal Civilian Government	2.2%	2.6%	2.5%	2.5%	2.5%	2.5%	2.4%	2.4%	2.3%	2.3%	2.1%
Federal Military	0.6%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%
State and Local Government	11.8%	13.3%	12.7%	12.6%	12.6%	12.6%	12.6%	12.5%	12.3%	12.2%	11.8%
Total Personal Income per Capita (in 2005 dollars)	37,492	37,959	38,681	38,357	38,468	38,798	39,260	41,739	46,458	51,194	62,955
Woods & Poole Economics Wealth Index (U.S. = 100)	118.7	116.5	115.5	114.8	114.5	114.4	114.5	115.3	117.0	118.6	122.2
Persons per Household (in number of people)	2.5	2.6	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.5	2.6

Table 4-20. Demographic and Employment Baseline Projections for Economic Impact Area FL-4 (continued).

	2005	2010	2011	2012	2013	2014	2015	2020	2025	2030	2040
Mean Household Total Personal Income (in 2005 dollars)	94,609	98,360	99,844	98,565	98,405	98,756	99,473	104,717	116,781	129,752	162,573
Number of Households (in thousands)	2,352	2,382	2,424	2,468	2,512	2,559	2,605	2,771	2,979	3,130	3,414
Income <$10,000 (thousands of households, 2000$)	9.1%	8.4%	8.2%	8.2%	8.1%	8.0%	7.8%	7.1%	6.1%	5.4%	4.0%
Income $10,000 to $19,999	12.1%	11.1%	10.9%	10.9%	10.7%	10.6%	10.5%	9.6%	8.2%	7.2%	5.3%
Income $20,000 to $29,999	12.6%	11.6%	11.4%	11.4%	11.3%	11.1%	11.0%	10.0%	8.6%	7.6%	5.6%
Income $30,000 to $44,999	17.3%	16.2%	15.9%	15.8%	15.7%	15.5%	15.3%	14.0%	12.0%	10.5%	7.8%
Income $45,000 to $59,999	15.0%	16.0%	16.2%	16.2%	16.3%	16.4%	16.4%	16.5%	15.4%	13.6%	10.1%
Income $60,000 to $74,999	10.7%	11.6%	11.8%	11.8%	12.0%	12.1%	12.3%	13.5%	15.5%	16.6%	14.7%
Income $75,000 to $99,999	10.1%	10.9%	11.1%	11.2%	11.3%	11.4%	11.6%	12.7%	14.8%	17.0%	22.2%
Income $100,000 or more	13.2%	14.3%	14.5%	14.6%	14.7%	14.9%	15.1%	16.6%	19.3%	22.2%	30.3%

Notes: Median Age and The Wealth Index are defined using averages of the original Woods & Poole values for the counties in the EIA; income per capita calculated using personal income/total population for the EIA; persons per household calculated using total population/number of households for the EIA.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-21

Peak Population Projections from the WPA Proposed Action as a Percent of Total Population

EIA	Low Case				High Case			
	Peak Annual	Peak Year	Baseline in Peak Year	Percent	Peak Annual	Peak Year	Baseline in Peak Year	Percent
Texas (TX)								
TX-1	549	2028	2,422,790	0.02%	1,085	2028	2,422,790	0.04%
TX-2	171	2019	708,030	0.02%	287	2016	680,380	0.04%
TX-3	3,173	2016	6,917,330	0.05%	5,253	2018	7,160,610	0.07%
Louisiana (LA)								
LA-1	228	2019	376,060	0.06%	386	2016	365,730	0.11%
LA-2	645	2016	627,930	0.10%	1,062	2016	627,930	0.17%
LA-3	862	2016	1,205,450	0.07%	1,453	2016	1,205,450	0.12%
LA-4	425	2016	1,280,660	0.03%	715	2016	1,280,660	0.06%
Florida (FL)								
FL-1	130	2019	998,490	0.01%	218	2016	959,100	0.02%
FL-2	256	2019	734,260	0.03%	427	2016	708,920	0.06%
FL-3	225	2019	4,196,900	0.01%	376	2016	4,003,870	0.01%
FL-4	158	2019	6,952,710	0.00%	267	2016	6,687,490	0.00%
Alabama (AL)								
AL-1	293	2019	783,980	0.04%	508	2016	763,990	0.07%
Mississippi (MS)								
MS-1	220	2028	538,750	0.04%	389	2016	500,080	0.08%

EIA = Economic Impact Area.

Source: Baseline employment projections based on Woods & Poole Economics, Inc. (2011).

Table 4-22

Peak Population Projections from the Cumulative OCS Program as a Percent of Total Employment

EIA	Low Case				High Case			
	Peak Annual	Peak Year	Baseline in Peak Year	Percent	Peak Annual	Peak Year	Baseline in Peak Year	Percent
Texas (TX)								
TX-1	16,250	2030	2,494,450	0.65%	25,369	2031	2,528,350	1.00%
TX-2	6,620	2031	819,450	0.81%	10,759	2031	819,450	1.31%
TX-3	137,573	2030	8,630,090	1.59%	203,022	2031	8,748,170	2.32%
Louisiana (LA)								
LA-1	8,959	2030	414,370	2.16%	14,763	2031	417,750	3.53%
LA-2	25,960	2030	733,820	3.54%	40,748	2031	741,210	5.50%
LA-3	33,867	2030	1,360,250	2.49%	54,048	2031	1,370,930	3.94%
LA-4	17,490	2030	1,379,210	1.27%	27,980	2031	1,386,050	2.02%
Florida (FL)								
FL-1	4,773	2031	1,156,870	0.41%	7,726	2031	1,156,870	0.67%
FL-2	9,402	2031	836,390	1.12%	15,307	2031	836,390	1.83%
FL-3	8,265	2031	4,971,850	0.17%	13,509	2031	4,971,850	0.27%
FL-4	5,916	2031	8,019,510	0.07%	9,658	2031	8,019,510	0.12%
Alabama (AL)								
AL-1	11,251	2030	858,150	1.31%	18,405	2031	864,680	2.13%
Mississippi (MS)								
MS-1	8,726	2030	545,250	1.60%	14,116	2031	548,380	2.57%

EIA = Economic Impact Area.

Source: Baseline employment projections based on Woods & Poole Economics, Inc. (2011).

Table 4-23

High-Case Employment Projections for the WPA Proposed Action by Economic Impact Area

Onshore Area	Employment (jobs)												
	Total (40-year total)				Direct		Indirect		Induced		Total		
	Direct	Indirect	Induced	All	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Peak Year
Industry Expenditure Effects													
Texas (TX)													
TX-1	1,058	513	1,732	3,302	27	122	13	58	44	240	85	419	2028
TX-2	599	230	465	1,294	15	51	6	20	12	40	33	111	2016
TX-3	6,780	3,116	12,778	22,675	174	617	80	271	328	1,140	581	2,028	2018
All TX EIA's	8,437	3,859	14,975	27,271	216	732	99	322	384	1,288	699	2,342	2018
The Rest of Texas	1,032	576	2,802	4,410	26	93	15	52	72	253	113	398	2016
Texas Total	9,468	4,436	17,777	31,681	243	821	114	371	456	1,523	812	2,714	2018
Louisiana (LA)													
LA-1	644	355	753	1,752	17	55	9	30	19	64	45	149	2016
LA-2	1,193	527	3,187	4,907	31	92	14	40	82	278	126	410	2016
LA-3	1,353	804	4,410	6,567	35	108	21	64	113	389	168	561	2016
LA-4	925	459	1,951	3,335	24	73	12	37	50	166	86	276	2016
All LA EIA's	4,115	2,146	10,300	16,560	106	328	55	170	264	898	425	1,396	2016
The Rest of Louisiana	511	187	982	1,680	13	46	5	17	25	91	43	154	2016
Louisiana Total	4,626	2,333	11,282	18,240	119	374	60	187	289	989	468	1,550	2016
Florida (FL)													
FL-1	364	139	423	926	9	33	4	13	11	38	24	84	2016
FL-2	776	309	748	1,834	20	70	8	28	19	67	47	165	2016
FL-3	611	279	732	1,622	16	55	7	25	19	65	42	145	2016
FL-4	429	199	537	1,165	11	39	5	18	14	47	30	103	2016
All FL EIA's	2,180	926	2,441	5,546	56	196	24	84	63	217	142	497	2016
The Rest of Florida	685	339	880	1,904	18	60	9	30	23	76	49	166	2016
Florida Total	2,864	1,265	3,321	7,450	73	257	32	114	85	292	191	663	2016
Alabama (AL)													
AL-1	719	281	1,219	2,219	18	63	7	25	31	108	57	196	2016
The Rest of Alabama	1,163	505	1,339	3,007	30	105	13	46	34	119	77	271	2016
Alabama-Total	1,882	786	2,558	5,226	48	169	20	71	66	227	134	467	2016
Mississippi (MS)													
MS-1	669	185	904	1,758	17	56	5	16	23	78	45	150	2016
The Rest of Mississippi	1,054	345	1,022	2,420	27	93	9	31	26	88	62	212	2016
Mississippi Total	1,723	530	1,926	4,178	44	150	14	46	49	165	107	361	2016
All EIA's, Regardless of State	16,119	7,397	29,839	53,355	413	1,343	190	605	765	2,571	1,368	4,503	2016
All States Above	20,563	9,350	36,863	66,776	527	1,726	240	781	945	3,197	1,712	5,703	2016

EIA = Economic Impact Area.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-24

Low-Case Employment Projections for the WPA Proposed Action by Economic Impact Area

Onshore Area	Employment (jobs)												
	Total (40-year total)				Direct		Indirect		Induced		Total		
	Direct	Indirect	Induced	All	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Peak Year
Industry Expenditure Effects													
Texas (TX)													
TX-1	487	238	919	1,644	12	51	6	25	24	136	42	212	2028
TX-2	320	123	249	692	8	31	3	12	6	23	18	66	2019
TX-3	3,959	1,807	7,507	13,274	102	412	46	164	192	704	340	1,225	2016
All TX EIA's	4,765	2,169	8,676	15,610	122	452	56	193	222	789	400	1,411	2016
The Rest of Texas	572	320	1,486	2,379	15	55	8	30	38	145	61	230	2016
Texas Total	5,338	2,489	10,162	17,989	137	483	64	223	261	935	461	1,641	2016
Louisiana (LA)													
LA-1	343	187	396	925	9	33	5	18	10	38	24	88	2019
LA-2	622	275	1,759	2,656	16	55	7	24	45	171	68	249	2016
LA-3	695	412	2,388	3,495	18	63	11	37	61	235	90	333	2016
LA-4	485	243	1,058	1,787	12	43	6	21	27	100	46	164	2016
All LA EIA's	2,145	1,117	5,601	8,863	55	191	29	99	144	543	227	831	2016
The Rest of Louisiana	279	103	531	913	7	28	3	10	14	54	23	92	2019
Louisiana Total	2,424	1,220	6,132	9,776	62	219	31	109	157	596	251	921	2016
Florida (FL)													
FL-1	196	76	226	497	5	20	2	8	6	22	13	50	2019
FL-2	416	167	394	978	11	43	4	17	10	38	25	99	2019
FL-3	327	151	385	862	8	34	4	15	10	37	22	87	2019
FL-4	231	108	285	623	6	24	3	11	7	27	16	61	2019
All FL EIA's	1,170	501	1,289	2,961	30	121	13	51	33	125	76	297	2019
The Rest of Florida	364	182	447	994	9	37	5	18	11	42	25	97	2019
Florida Total	1,534	684	1,737	3,954	39	158	18	69	45	167	101	393	2019
Alabama (AL)													
AL-1	386	152	636	1,174	10	38	4	15	16	61	30	113	2019
The Rest of Alabama	633	280	703	1,616	16	62	7	27	18	66	41	154	2019
Alabama-Total	1,020	432	1,338	2,790	26	100	11	41	34	126	72	267	2019
Mississippi (MS)													
MS-1	347	95	474	916	9	33	2	9	12	48	23	85	2028
The Rest of Mississippi	569	187	536	1,291	15	55	5	18	14	53	33	119	2019
Mississippi Total	915	282	1,010	2,208	23	88	7	27	26	101	57	203	2016
All EIA's, Regardless of State	8,813	4,035	16,676	29,524	226	796	103	359	428	1,556	757	2,712	2016
All States Above	11,231	5,107	20,379	36,717	288	1,024	131	460	523	1,907	941	3,392	2016

EIA = Economic Impact Area.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-25

Peak Employment Projections from the WPA Proposed Action as a Percent of Total Employment

EIA	Low Case				High Case			
	Peak Annual	Peak Year	Baseline in Peak Year	Percent	Peak Annual	Peak Year	Baseline in Peak Year	Percent
Texas (TX)								
TX-1	212	2028	1,079,320	0.02%	419	2028	1,079,320	0.04%
TX-2	66	2019	341,330	0.02%	111	2016	326,630	0.03%
TX-3	1,225	2016	3,983,090	0.03%	2,028	2018	4,126,010	0.05%
Louisiana (LA)								
LA-1	88	2019	195,880	0.04%	149	2016	188,390	0.08%
LA-2	249	2016	349,800	0.07%	410	2016	349,800	0.12%
LA-3	333	2016	710,530	0.05%	561	2016	710,530	0.08%
LA-4	164	2016	765,250	0.02%	276	2016	765,250	0.04%
Florida (FL)								
FL-1	50	2019	536,850	0.01%	84	2016	513,990	0.02%
FL-2	99	2019	348,860	0.03%	165	2016	335,440	0.05%
FL-3	87	2019	2,099,530	0.00%	145	2016	1,996,150	0.01%
FL-4	61	2019	3,799,780	0.00%	103	2016	3,616,230	0.00%
Alabama (AL)								
AL-1	113	2019	420,720	0.03%	196	2016	402,120	0.05%
Mississippi (MS)								
MS-1	85	2028	299,120	0.03%	150	2016	264,400	0.06%

EIA = Economic Impact Area.

Source: Baseline employment projections based on Woods & Poole Economics, Inc. (2011).

Table 4-26

High-Case Cumulative Employment Projections by Economic Impact Area

Onshore Area	Employment (jobs)												
	Total (40-year total)				Direct		Indirect		Induced		Total		
	Direct	Indirect	Induced	All	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Peak Year
Industry Expenditure Effects													
Texas (TX)													
TX-1	101,204	49,345	160,029	310,578	2,530	3,169	1,234	1,538	4,001	5,132	7,764	9,795	2031
TX-2	68,931	26,484	52,935	148,351	1,723	1,926	662	743	1,323	1,485	3,709	4,154	2031
TX-3	875,258	394,078	1,613,370	2,882,706	21,881	23,691	9,852	10,820	40,334	43,901	72,068	78,387	2031
All TX EIA's	1,045,394	469,908	1,826,334	3,341,635	26,135	28,682	11,748	13,062	45,658	50,343	83,541	92,029	2031
The Rest of Texas	119,442	66,568	325,260	511,270	2,986	3,295	1,664	1,837	8,131	8,996	12,782	14,127	2031
Texas Total	1,164,836	536,475	2,151,593	3,852,905	29,121	31,922	13,412	14,880	53,790	59,212	96,323	105,995	2031
Louisiana (LA)													
LA-1	74,190	40,500	86,487	201,176	1,855	2,093	1,012	1,158	2,162	2,448	5,029	5,700	2031
LA-2	134,404	59,112	364,216	557,732	3,360	3,826	1,478	1,702	9,105	10,205	13,943	15,733	2031
LA-3	148,680	88,820	501,129	738,629	3,717	4,258	2,220	2,559	12,528	14,059	18,466	20,868	2031
LA-4	106,734	52,897	226,187	385,818	2,668	2,991	1,322	1,493	5,655	6,320	9,645	10,803	2031
All LA EIA's	464,007	241,328	1,178,020	1,883,355	11,600	13,143	6,033	6,898	29,450	32,993	47,084	53,012	2031
The Rest of Louisiana	59,634	22,022	115,192	196,849	1,491	1,650	551	608	2,880	3,191	4,921	5,449	2031
Louisiana Total	523,641	263,350	1,293,212	2,080,203	13,091	14,774	6,584	7,501	32,330	36,184	52,005	58,400	2031
Florida (FL)													
FL-1	42,424	16,210	49,130	107,763	1,061	1,175	405	449	1,228	1,359	2,694	2,983	2031
FL-2	90,765	36,136	86,636	213,537	2,269	2,516	903	1,000	2,166	2,394	5,338	5,910	2031
FL-3	71,201	32,456	84,760	188,417	1,780	1,976	811	899	2,119	2,340	4,710	5,216	2031
FL-4	49,938	23,096	61,586	134,619	1,248	1,385	577	639	1,540	1,705	3,365	3,729	2031
All FL EIA's	254,328	107,897	282,111	644,336	6,358	7,052	2,697	2,987	7,053	7,799	16,108	17,838	2031
The Rest of Florida	79,235	39,159	100,834	219,227	1,981	2,202	979	1,086	2,521	2,787	5,481	6,075	2031
Florida Total	333,563	147,056	382,945	863,563	8,339	9,254	3,676	4,074	9,574	10,586	21,589	23,913	2031
Alabama (AL)													
AL-1	83,091	32,364	140,712	256,167	2,077	2,305	809	899	3,518	3,902	6,404	7,106	2031
The Rest of Alabama	135,095	58,236	154,218	347,549	3,377	3,726	1,456	1,604	3,855	4,249	8,689	9,579	2031
Alabama-Total	218,186	90,600	294,930	603,716	5,455	6,031	2,265	2,502	7,373	8,149	15,093	16,680	2031
Mississippi (MS)													
MS-1	73,295	20,167	98,561	192,023	1,832	2,068	504	572	2,464	2,810	4,801	5,450	2031
The Rest of Mississippi	120,036	39,068	112,509	271,613	3,001	3,309	977	1,081	2,813	3,163	6,790	7,552	2031
Mississippi Total	193,331	59,235	211,070	463,636	4,833	5,377	1,481	1,653	5,277	5,973	11,591	13,002	2031
All EIA's, Regardless of State	1,920,114	871,664	3,525,738	6,317,516	48,003	53,114	21,792	24,375	88,143	97,647	157,938	175,136	2031
All States Above	2,433,557	1,096,717	4,333,750	7,864,024	60,839	67,172	27,418	30,534	108,344	119,800	196,601	217,506	2031

EIA = Economic Impact Area.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-27

Low-Case Cumulative Employment Projections by Economic Impact Area

Onshore Area	Employment (jobs)												
	Total (40-year total)				Direct		Indirect		Induced		Total		
	Direct	Indirect	Induced	All	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Peak Year
Industry Expenditure Effects													
Texas (TX)													
TX-1	62,348	30,507	105,629	198,484	1,559	1,842	763	904	2,641	3,532	4,962	6,274	2030
TX-2	43,108	16,643	32,932	92,683	1,078	1,187	416	460	823	910	2,317	2,556	2031
TX-3	593,169	265,323	1,093,580	1,952,072	14,829	16,067	6,633	7,280	27,340	29,770	48,802	53,117	2030
All TX EIA's	698,624	312,473	1,232,141	2,243,238	17,466	19,048	7,812	8,620	30,804	33,938	56,081	61,606	2030
The Rest of Texas	75,930	42,414	201,073	319,417	1,898	2,085	1,060	1,172	5,027	5,513	7,985	8,766	2031
Texas Total	774,555	354,887	1,433,214	2,562,655	19,364	21,132	8,872	9,792	35,830	39,447	64,066	70,371	2030
Louisiana (LA)													
LA-1	46,222	25,062	53,602	124,886	1,156	1,277	627	699	1,340	1,484	3,122	3,459	2030
LA-2	85,002	37,337	237,488	359,828	2,125	2,367	933	1,054	5,937	6,605	8,996	10,023	2030
LA-3	92,305	54,818	322,207	469,331	2,308	2,581	1,370	1,544	8,055	8,951	11,733	13,076	2030
LA-4	66,637	33,179	144,285	244,102	1,666	1,843	829	924	3,607	3,986	6,103	6,753	2030
All LA EIA's	290,167	150,397	757,583	1,198,146	7,254	8,067	3,760	4,219	18,940	21,025	29,954	33,310	2030
The Rest of Louisiana	37,629	13,977	72,759	124,365	941	1,030	349	383	1,819	1,990	3,109	3,403	2031
Louisiana Total	327,796	164,374	830,342	1,322,512	8,195	9,097	4,109	4,602	20,759	23,013	33,063	36,710	2030
Florida (FL)													
FL-1	26,601	10,222	30,494	67,318	665	728	256	280	762	835	1,683	1,843	2031
FL-2	56,780	22,736	53,004	132,520	1,419	1,554	568	623	1,325	1,453	3,313	3,630	2031
FL-3	44,463	20,375	51,557	116,394	1,112	1,218	509	559	1,289	1,414	2,910	3,191	2031
FL-4	31,246	14,529	37,473	83,247	781	856	363	398	937	1,030	2,081	2,284	2031
All FL EIA's	159,090	67,861	172,529	399,480	3,977	4,357	1,697	1,860	4,313	4,732	9,987	10,948	2031
The Rest of Florida	49,197	24,473	59,684	133,353	1,230	1,350	612	673	1,492	1,641	3,334	3,664	2031
Florida Total	208,286	92,334	232,212	532,832	5,207	5,707	2,308	2,532	5,805	6,372	13,321	14,612	2031
Alabama (AL)													
AL-1	51,839	20,281	85,875	157,995	1,296	1,423	507	559	2,147	2,363	3,950	4,344	2030
The Rest of Alabama	84,739	36,868	93,167	214,773	2,118	2,324	922	1,020	2,329	2,566	5,369	5,910	2030
Alabama-Total	136,579	57,148	179,042	372,768	3,414	3,746	1,429	1,579	4,476	4,930	9,319	10,254	2030
Mississippi (MS)													
MS-1	45,687	12,545	61,736	119,967	1,142	1,261	314	347	1,543	1,766	2,999	3,369	2030
The Rest of Mississippi	75,647	24,751	69,033	169,432	1,891	2,075	619	681	1,726	1,953	4,236	4,694	2030
Mississippi Total	121,334	37,296	130,769	289,399	3,033	3,335	932	1,028	3,269	3,719	7,235	8,048	2030
All EIA's, Regardless of State	1,245,407	563,556	2,309,863	4,118,827	31,135	34,146	14,089	15,602	57,747	63,795	102,971	113,543	2030
All States Above	1,568,550	706,039	2,805,579	5,080,167	39,214	43,006	17,651	19,530	70,139	77,438	127,004	139,974	2030

EIA = Economic Impact Area

Source: Woods & Poole Economics, Inc., 2011.

Table 4-28

Low- and High-Case Cumulative Employment Projections as a Percent of Total Employment

EIA	Low Case				High Case			
	Peak Annual	Peak Year	Baseline in Peak Year	Percent	Peak Annual	Peak Year	Baseline in Peak Year	Percent
Texas (TX)								
TX-1	6,274	2030	1,119,420	0.56%	9,795	2031	1,140,070	0.86%
TX-2	2,556	2031	404,890	0.63%	4,154	2031	404,890	1.03%
TX-3	53,117	2030	5,075,770	1.05%	78,387	2031	5,162,030	1.52%
Louisiana (LA)								
LA-1	3,459	2030	226,000	1.53%	5,700	2031	228,970	2.49%
LA-2	10,023	2030	432,940	2.32%	15,733	2031	439,300	3.58%
LA-3	13,076	2030	863,290	1.51%	20,868	2031	875,160	2.38%
LA-4	6,753	2030	852,920	0.79%	10,803	2031	859,450	1.26%
Florida (FL)								
FL-1	1,843	2031	637,380	0.29%	2,983	2031	637,380	0.47%
FL-2	3,630	2031	408,080	0.89%	5,910	2031	408,080	1.45%
FL-3	3,191	2031	2,560,650	0.12%	5,216	2031	2,560,650	0.20%
FL-4	2,284	2031	4,609,300	0.05%	3,729	2031	4,609,300	0.08%
Alabama (AL)								
AL-1	4,344	2030	496,540	0.87%	7,106	2031	504,080	1.41%
Mississippi (MS)								
MS-1	3,369	2030	305,320	1.10%	5,450	2031	308,460	1.77%

EIA = Economic Impact Area.

Source: Baseline employment projections based on Woods & Poole Economics, Inc. (2011).

Table 4-29

Angler Trips in the Gulf of Mexico by Location and Mode in 2009, 2010, and 2011

State	Area	2009	2010	2011	% State Total in 2011
Alabama	Shore Ocean (<3 nmi)	322,126	447,041	603,546	24.3
	Shore Inland	449,470	365,234	598,700	24.1
	Charter Ocean (<3 nmi)	9,166	8,860	19,874	0.8
	Charter Ocean (>3 nmi)	36,259	17,424	48,616	2.0
	Charter Inland	10,656	7,221	6,351	0.3
	Private/Rental Ocean (<3 nmi)	131,997	114,816	191,563	7.7
	Private/Rental Ocean (>3 nmi)	134,411	69,335	188,994	7.6
	Private/Rental Inland	618,502	656,226	825,821	33.3
	Total	1,712,587	1,686,157	2,483,465	100.0
West Florida	Shore Ocean (<9 nmi)	2,688,011	1,610,807	1,982,194	14.3
	Shore Inland	3,793,756	4,034,208	3,862,665	27.8
	Charter Ocean (<9 nmi)	196,753	159,317	179,880	1.3
	Charter Ocean (>9 nmi)	262,005	203,201	236,088	1.7
	Charter Inland	113,842	98,440	119,826	0.9
	Private/Rental Ocean (<9 nmi)	2,605,196	2,257,349	1,901,217	13.7
	Private/Rental Ocean (>9 nmi)	751,869	681,551	500,067	3.6
	Private/Rental Inland	5,265,888	5,221,323	5,118,740	36.8
	Total	15,677,320	14,266,196	13,900,677	100.0
Louisiana	Shore Ocean (<3 nmi)	38,930	11,664	48,893	1.1
	Shore Inland	730,053	717,006	1,073,035	23.4
	Charter Ocean (<3 nmi)	3,931	2,762	6,937	0.2
	Charter Ocean (>3 nmi)	21,173	8,106	15,742	0.3
	Charter Inland	157,692	68,018	90,057	2.0
	Private/Rental Ocean (<3 nmi)	81,008	59,347	77,986	1.7
	Private/Rental Ocean (>3 nmi)	99,352	11,568	80,952	1.8
	Private/Rental Inland	2,995,875	2,984,016	3,182,645	69.5
	Total	4,128,014	3,862,487	4,576,247	100.0
Mississippi	Shore Ocean (<3 nmi)	143	0	0	0.0
	Shore Inland	309,612	596,544	760,788	47.1
	Charter Ocean (<3 nmi)	2,803	904	3,123	0.2
	Charter Ocean (>3 nmi)	330	949	221	0.0
	Charter Inland	7,656	4,989	7,891	0.5
	Private/Rental Ocean (<3 nmi)	16,962	12,419	18,682	1.2
	Private/Rental Ocean (>3 nmi)	26,316	4,626	12,974	0.8
	Private/Rental Inland	715,505	612,162	811,711	50.2
	Total	1,079,327	1,232,593	1,615,390	100.0
Gulf Total	Shore Ocean (<3 nmi)	3,049,210	2,069,512	2,634,633	11.7
	Shore Inland	5,282,891	5,712,992	6,295,188	27.9
	Charter Ocean (<3 nmi)	212,653	171,843	209,814	0.9
	Charter Ocean (>3 nmi)	319,767	229,680	300,667	1.3
	Charter Inland	289,846	178,668	224,125	1.0
	Private/Rental Ocean (<3 nmi)	2,835,163	2,443,931	2,189,448	9.7
	Private/Rental Ocean (>3 nmi)	1,011,948	767,080	782,987	3.5
	Private/Rental Inland	9,595,770	9,473,727	9,938,917	44.0
	Total	22,597,248	21,047,433	22,575,779	100.0

Notes: This table presents the total of fishing data from Louisiana, Mississippi, Alabama, and West Florida.
State waters in Florida extend 9 nmi (10.4 mi; 16.67 km) from the coast rather than the typical 3 nmi (3.5 mi; 5.6 km).

Source: USDOC, NMFS, 2012.

Table 4-30

Fish Species Caught by Recreational Anglers from 2007 through 2011

Species/Year	2007	2008	2009	2010	2011
Panel A: Number of Fish					
Atlantic Croaker	3,928,295	5,020,732	5,029,701	5,337,312	7,950,146
Black Drum	1,310,832	1,975,432	1,770,479	1,763,633	1,884,447
Blackfin Tuna	85,579	137,887	84,978	32,147	53,829
Cobia	118,789	160,155	86,106	62,400	109,388
Dolphins	518,324	640,488	401,891	270,119	456,829
Gag	3,003,086	4,556,734	2,969,559	2,260,741	1,269,038
Gray Snapper	5,632,849	7,316,720	4,446,255	2,451,867	2,800,767
Great Amberjack	243,007	248,910	212,229	382,672	250,954
King Mackerel	456,714	374,338	673,530	291,065	244,812
Little Tuny	376,257	203,560	168,356	140,474	201,761
Pinfishes	10,929,444	16,112,529	9,876,807	10,415,589	8,851,759
Red Drum	9,068,231	10,310,311	8,132,874	9,718,538	9,992,160
Red Grouper	1,054,261	3,105,159	3,172,238	2,242,746	2,009,532
Red Snapper	4,481,634	2,789,675	2,941,448	1,769,536	2,041,512
Sand Seatrout	4,770,124	5,335,003	6,632,448	6,329,040	8,268,113
Sheepshead	2,420,502	3,055,781	2,911,901	2,884,114	3,849,215
Southern Flounder	891,087	594,926	837,108	991,760	987,796
Southern Kingfish	1,604,741	1,590,202	1,417,523	1,450,408	1,163,302
Spanish Mackerel	3,435,418	3,938,013	3,138,754	4,040,757	3,475,966
Spotted Seatrout	30,037,637	35,141,138	30,700,217	24,703,470	32,700,839
Striped Mullet	1,307,575	1,405,717	967,398	1,791,862	2,214,375
White Grunt	2,183,714	3,721,050	2,285,007	2,494,075	2,852,807
Panel B: Pounds					
Atlantic Croaker	627,525	746,737	417,298	529,427	816,562
Black Drum	2,650,910	3,329,225	2,720,006	2,433,846	2,487,203
Blackfin Tuna	371,117	854,254	1,225,530	276,947	415,204
Cobia	1,019,190	797,585	510,151	483,465	1,132,455
Dolphins	2,005,505	1,758,506	2,114,876	685,194	1,295,453
Gag	2,521,392	3,250,623	1,485,256	1,630,999	665,580
Gray Snapper	1,639,212	2,016,456	1,525,684	882,715	1,250,520
Great Amberjack	1,029,530	1,407,076	1,523,734	1,483,609	946,467
King Mackerel	2,552,044	1,804,192	3,677,465	1,808,493	1,679,476
Little Tuny	582,894	439,608	517,938	418,973	455,612
Pinfishes	1,394,218	2,029,509	801,445	2,028,069	1,574,080
Red Drum	13,202,268	14,496,283	11,773,528	13,509,248	15,340,878
Red Grouper	1,111,020	879,028	981,966	762,208	640,002
Red Snapper	4,077,886	2,806,925	3,648,516	1,655,857	3,486,486
Sand Seatrout	1,624,380	1,880,159	2,308,490	2,579,227	3,412,201
Sheepshead	3,522,023	4,415,722	3,904,616	3,296,696	6,990,784
Southern Flounder	966,768	687,368	910,196	1,104,725	1,120,655
Southern Kingfish	542,043	553,205	638,419	568,799	390,627
Spanish Mackerel	2,021,013	2,943,974	2,072,995	2,546,029	2,132,604
Spotted Seatrout	13,332,324	16,156,781	15,393,934	12,259,023	17,924,543
Striped Mullet	1,566,017	1,614,209	899,038	2,674,277	2,055,630
White Grunt	568,247	1,131,685	1,030,272	930,723	1,266,126

Source: USDOC, NMFS, 2012.

Table 4-31

Peak Population Projections from the CPA Proposed Action as a Percent of Total Population

EIA	Low Case				High Case			
	Peak Annual	Peak Year	Baseline in Peak Year	Percent	Peak Annual	Peak Year	Baseline in Peak Year	Percent
Texas (TX)								
TX-1	1,427	2030	2,494,450	0.06%	4,084	2030	2,494,450	0.16%
TX-2	435	2017	689,560	0.06%	852	2020	717,320	0.12%
TX-3	9,609	2017	7,038,820	0.14%	17,674	2017	7,038,820	0.25%
Louisiana (LA)								
LA-1	588	2017	369,150	0.16%	1,114	2020	379,540	0.29%
LA-2	1,668	2017	635,360	0.26%	3,699	2030	733,820	0.50%
LA-3	2,196	2017	1,216,410	0.18%	4,823	2030	1,360,250	0.35%
LA-4	1,145	2017	1,287,530	0.09%	2,170	2020	1,308,490	0.17%
Florida (FL)								
FL-1	329	2017	972,190	0.03%	650	2020	1,011,710	0.06%
FL-2	648	2017	717,340	0.09%	1,292	2020	742,780	0.17%
FL-3	567	2017	4,068,050	0.01%	1,140	2020	4,261,620	0.03%
FL-4	404	2017	6,775,610	0.01%	811	2020	7,041,770	0.01%
Alabama (AL)								
AL-1	756	2017	770,620	0.10%	1,502	2020	790,710	0.19%
Mississippi (MS)								
MS-1	567	2030	545,250	0.10%	1,412	2030	545,250	0.26%

EIA = Economic Impact Area.

Source: Baseline employment projections based on Woods & Poole Economics, Inc. (2011).

Table 4-32

High-Case Employment Projections for the CPA Proposed Action by Economic Impact Area

Onshore Area	Employment (jobs)												
	Total (40-year total)				Direct		Indirect		Induced		Total		
	Direct	Indirect	Induced	All	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Peak Year
Industry Expenditure Effects													
Texas (TX)													
TX-1	4,279	2,082	6,662	13,023	110	462	53	223	171	892	334	1,577	2030
TX-2	2,604	1,013	2,001	5,618	67	154	26	59	51	116	144	329	2020
TX-3	33,942	15,265	62,791	111,997	870	2,133	391	906	1,610	3,785	2,872	6,824	2017
All TX EIA's	40,825	18,360	71,453	130,639	1,047	2,440	471	1,059	1,832	4,237	3,350	7,716	2020
The Rest of Texas	4,390	2,439	11,918	18,747	113	281	63	156	306	735	481	1,171	2020
Texas Total	45,215	20,799	83,371	149,386	1,159	2,701	533	1,215	2,138	4,971	3,830	8,887	2020
Louisiana (LA)													
LA-1	2,868	1,607	3,364	7,838	74	161	41	88	86	185	201	430	2020
LA-2	5,287	2,337	14,276	21,899	136	344	60	166	366	919	562	1,428	2030
LA-3	5,897	3,572	19,734	29,203	151	396	92	231	506	1,235	749	1,862	2030
LA-4	4,122	2,064	8,749	14,935	106	229	53	119	224	498	383	838	2020
All LA EIA's	18,174	9,580	46,122	73,876	466	1,118	246	604	1,183	2,831	1,894	4,553	2030
The Rest of Louisiana	2,209	814	4,317	7,341	57	140	21	52	111	264	188	457	2020
Louisiana Total	20,383	10,394	50,440	81,217	523	1,235	267	648	1,293	3,065	2,082	4,948	2030
Florida (FL)													
FL-1	1,588	605	1,810	4,003	41	100	16	39	46	113	103	251	2020
FL-2	3,402	1,352	3,148	7,902	87	215	35	86	81	199	203	499	2020
FL-3	2,675	1,214	3,053	6,942	69	168	31	77	78	195	178	440	2020
FL-4	1,867	861	2,227	4,954	48	118	22	55	57	141	127	313	2020
All FL EIA's	9,531	4,033	10,237	23,801	244	601	103	256	262	647	610	1,504	2020
The Rest of Florida	2,960	1,457	3,566	7,983	76	184	37	91	91	225	205	500	2020
Florida Total	12,491	5,489	13,803	31,783	320	785	141	347	354	871	815	2,004	2020
Alabama (AL)													
AL-1	3,089	1,205	5,149	9,443	79	192	31	74	132	313	242	580	2020
The Rest of Alabama	4,949	2,107	5,465	12,521	127	318	54	137	140	352	321	807	2020
Alabama-Total	8,037	3,312	10,615	21,964	206	510	85	211	272	665	563	1,386	2020
Mississippi (MS)													
MS-1	2,776	766	3,728	7,271	71	196	20	56	96	293	186	545	2030
The Rest of Mississippi	4,464	1,455	4,095	10,014	114	283	37	93	105	302	257	660	2030
Mississippi Total	7,241	2,221	7,824	17,285	186	462	57	147	201	596	443	1,205	2030
All EIA's, Regardless of State	74,394	33,944	136,690	245,029	1,908	4,378	870	1,938	3,505	8,018	6,283	14,335	2020
All States Above	93,367	42,216	166,052	301,635	2,394	5,585	1,082	2,468	4,258	9,849	7,734	17,902	2020

EIA = Economic Impact Area.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-33

Low-Case Employment Projections for the CPA Proposed Action by Economic Impact Area

Onshore Area	Employment (jobs)												
	Total (40-year total)				Direct		Indirect		Induced		Total		
	Direct	Indirect	Induced	All	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Average Annual	Peak Annual	Peak Year
Industry Expenditure Effects													
Texas (TX)													
TX-1	1,711	839	2,877	5,426	44	136	22	68	74	347	139	551	2030
TX-2	1,180	460	905	2,545	30	78	12	30	23	60	65	168	2017
TX-3	16,645	7,432	30,787	54,864	427	1,132	191	491	789	2,087	1,407	3,710	2017
All TX EIA's	19,536	8,731	34,569	62,835	501	1,311	224	570	886	2,283	1,611	4,164	2017
The Rest of Texas	2,047	1,141	5,410	8,598	52	140	29	77	139	376	220	593	2017
Texas Total	21,583	9,871	39,979	71,433	553	1,451	253	647	1,025	2,659	1,832	4,757	2017
Louisiana (LA)													
LA-1	1,286	710	1,499	3,495	33	84	18	45	38	98	90	227	2017
LA-2	2,357	1,040	6,639	10,036	60	149	27	70	170	431	257	644	2017
LA-3	2,572	1,549	9,033	13,155	66	165	40	102	232	590	337	848	2017
LA-4	1,843	926	4,016	6,785	47	119	24	59	103	264	174	442	2017
All LA EIA's	8,059	4,224	21,187	33,470	207	515	108	270	543	1,383	858	2,160	2017
The Rest of Louisiana	1,020	379	1,991	3,389	26	71	10	26	51	139	87	236	2017
Louisiana Total	9,078	4,603	23,178	36,859	233	586	118	292	594	1,522	945	2,396	2017
Florida (FL)													
FL-1	727	279	824	1,830	19	50	7	19	21	57	47	127	2017
FL-2	1,553	622	1,417	3,592	40	108	16	43	36	99	92	250	2017
FL-3	1,219	557	1,370	3,146	31	84	14	38	35	96	81	219	2017
FL-4	853	396	1,000	2,249	22	59	10	27	26	69	58	156	2017
All FL EIA's	4,353	1,854	4,610	10,817	112	302	48	128	118	321	277	751	2017
The Rest of Florida	1,342	665	1,560	3,567	34	92	17	45	40	108	91	246	2017
Florida Total	5,695	2,519	6,170	14,384	146	393	65	173	158	430	369	996	2017
Alabama (AL)													
AL-1	1,404	550	2,301	4,255	36	96	14	37	59	158	109	292	2017
The Rest of Alabama	2,277	983	2,445	5,705	58	158	25	68	63	171	146	396	2017
Alabama-Total	3,682	1,532	4,746	9,960	94	254	39	105	122	329	255	688	2017
Mississippi (MS)													
MS-1	1,224	336	1,658	3,218	31	85	9	24	43	124	83	219	2030
The Rest of Mississippi	2,035	665	1,813	4,513	52	141	17	46	46	131	116	311	2020
Mississippi Total	3,259	1,001	3,471	7,731	84	225	26	70	89	255	198	530	2020
All EIA's, Regardless of State	34,576	15,695	64,326	114,596	887	2,308	402	1,020	1,649	4,254	2,938	7,582	2017
All States Above	43,297	19,527	77,544	140,368	1,110	2,910	501	1,283	1,988	5,168	3,599	9,360	2017

EIA = Economic Impact Area.

Source: Woods & Poole Economics, Inc., 2011.

Table 4-34

Peak Employment Projections from the CPA Proposed Action as a Percent of Total Employment

EIA	Low Case				High Case			
	Peak Annual	Peak Year	Baseline in Peak Year	Percent	Peak Annual	Peak Year	Baseline in Peak Year	Percent
Texas (TX)								
TX-1	551	2030	1,119,420	0.05%	1,577	2030	1,119,420	0.14%
TX-2	168	2017	331,480	0.05%	329	2020	346,340	0.09%
TX-3	3,710	2017	4,054,020	0.09%	6,824	2017	4,054,020	0.17%
Louisiana (LA)								
LA-1	227	2017	190,850	0.12%	430	2020	198,430	0.22%
LA-2	644	2017	355,350	0.18%	1,428	2030	432,940	0.33%
LA-3	848	2017	720,630	0.12%	1,862	2030	863,290	0.22%
LA-4	442	2017	771,300	0.06%	838	2020	789,650	0.11%
Florida (FL)								
FL-1	127	2017	521,510	0.02%	251	2020	544,670	0.05%
FL-2	250	2017	339,840	0.07%	499	2020	353,430	0.14%
FL-3	219	2017	2,030,110	0.01%	440	2020	2,134,990	0.02%
FL-4	156	2017	3,676,610	0.00%	313	2020	3,862,560	0.01%
Alabama (AL)								
AL-1	292	2017	408,230	0.07%	580	2020	427,110	0.14%
MS-1	219	2030	496,540	0.04%	545	2030	496,540	0.11%

EIA = Economic Impact Area.

Source: Baseline employment projections based on Woods & Poole Economics, Inc. (2011).

REFERENCES

Butchart, S.H.M., A.J. Stattersfield, L.A. Bennun, S.M. Shutes, H.R. Akçakaya, J.E.M. Baillie, S.N. Stuart, C. Hilton-Taylor, and G.M. Mace. 2004. Measuring global trends in the status of biodiversity: Red List indices for birds. PLoS Biology 2(12): 11 pp. Internet website: http://www.plosbiology.org/article/info:doi/10.1371/journal.pbio.0020383.

Butchart, S.H.M., A.J. Stattersfield, J.E.M. Baillie, L.A. Bennun, S.N. Stuart, H.R. Akçakaya, C. Hilton-Taylor, and G.M. Mace. 2005. Using Red List indices to measure progress towards the 2010 target and beyond. Philosophical Transactions of the Royal Society of London B 360:255-268.

Burger, A.E. 1993. Estimating the mortality of seabirds following oil spills: Effects of spill volume. Marine Pollution Bulletin 26(3):140-143.

Byrd, G.V., J.H. Reynolds, and P.L. Flint. 2009. Persistence rates and detection probabilities of bird carcasses on beaches of Unalaska Island, Alaska, following the wreck of the M/V *Selendang Ayu*. Marine Ornithology 37:197-204.

Canadian Center for Energy Information. 2010. What are oil sands and heavy oil? Internet website: http://www.centreforenergy.com/AboutEnergy/ONG/OilsandsHeavyOil/Overview.asp?page=1. Accessed November 10, 2011.

Castege, I., Y. Lalanne, V. Gouriou, G. Hemery, M. Girin, F. D'Amico, C. Mouches, J. D'Elbe, L. Soulier, J. Pensu, D. Lafitte, and F. Pautrizel. 2007. Estimating actual seabirds mortality at sea and relationship with oil spills: lesson from the *Prestige* oil spill in Aquitaine (France). Ardeola 54:289-307.

Fisher, M. 2012. Official communication. Effort and catch data. Texas Parks and Wildlife Department.

Flint, P.L. and A.C. Fowler. 1998. A drift experiment to assess the influence of wind on recovery of oiled seabird on St. Paul Island, Alaska. Marine Pollution Bulletin 36:165-166.

Flint, P.L., A.C. Fowler, and R.F. Rockwell. 1999. Modeling bird mortality associated with the M/V *Citrus* oil spill off St. Paul Island, Alaska. Ecological Modelling 117:261-267.

Flint, P.L., E.W. Lance, K.M. Sowl, and T.F. Donnelly. 2010. Estimating carcass persistence and scavenging bias in a human-influenced landscape in western Alaska. Journal of Field Ornithology 81:206-214.

Ford, R.G. 2006. Using beached bird monitoring data for seabird damage assessment: The importance of search interval. Marine Ornithology 34:91-98.

Ford, R.G., M.L. Bonnell, D.H. Varoujean, G.W. Page, H.R. Carter, B.E. Sharp, D. Heinemann, and J.L. Casey. 1996. Total direct mortality of seabirds from the *Exxon Valdez* oil spill. American Fisheries Society Symposium 18:684-711.

Ford, R.G. and M.A. Zafonte. 2009. Scavenging of seabird carcasses at oil spill sites in California and Oregon. Marine Ornithology 37:205-211.

Fowler, A.C. and P.L. Flint. 1997. Persistence rates and detection probabilities of oiled king eider carcasses on St. Paul Island, Alaska. Marine Pollution Bulletin 34:522-526.

Hampton, S. and M. Zafonte. 2005. Factors influencing beached bird collection during the *Luckenbach* 2001/02 oil spill. Marine Ornithology 34:109-113.

Harris, J.B.C., J.L. Reid, B.R. Scheffers, T.C. Wanger, N.S. Sodhi, D.A. Fordham, and B.W. Brook. 2012. Conserving imperiled species: A comparison of the IUCN Red List and U.S. Endangered Species Act. Conservation Letters 5:64-72.

Michel, J. 1992. Chapter 2. Oil behavior and toxicity. In: Hayes, M.O., R. Hoff, J. Michel, D. Scholz, and G. Shigenaka. An introduction to coastal habitats and biological resources for oil spill response.

U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, Office of Response and Restoration. NOAA Report No. HMRAD 92-4. Pp. 2-1 through 2-9.

NatureServe Explorer. 2012. Endangered species. Internet website: http://www.natureserve.org/explorer/.

Piatt, J.F. and R.G. Ford. 1996. How many seabirds were killed by the *Exxon Valdez* oil spill? American Fisheries Society Symposium 18:712-719.

Piatt, J.F., H.R. Carter, and D.N. Nettleship. 1990a. Effects of oil pollution in marine bird populations. In: White, J., ed. The effects of oil on wildlife: Research, rehabilitation and general concerns. Proceedings of the Oil Symposium, Herndon, VA, October 16-18, 1990. Hanover, PA: Sheridan Press. Pp. 125-141.

Piatt, J.F., C.J. Lensink, W. Butler, M. Kendziorek, and D.R. Nysewander. 1990b. Immediate impact of the 'Exxon Valdez' oil spill on seabirds. Auk 107:387-397.

U.S. Dept. of Commerce. National Marine Fisheries Service. 2012. Recreational fishing online database. Internet website: http://www.st.nmfs.noaa.gov/st1/recreational/queries/index.html. Accessed March 6, 2012.

U.S. Dept. of Labor. Bureau of Labor Statistics. 2012. Quarterly census of employment and wages for 2008-2011. Internet website: http://www.bls.gov/cew/. Accessed August 1, 2, 6, and 10, 2012.

U.S. Dept. of the Interior. Fish and Wildlife Service. 2011. *Deepwater Horizon* bird impact data from the DOI-ERDC NRDA database 12 May 2011. Internet website: http://www.fws.gov/home/dhoilspill/pdfs/Bird%20Data%20Species%20Spreadsheet%2005122011.pdf.

U.S. Dept. of the Interior. Fish and Wildlife Service. 2012a. Official communication. Email regarding Federally listed avian species to be considered in the NEPA analyses. U.S. Dept. of the Interior, Fish and Wildlife Service, Region 4, Ecological Services Field Office, Lafayette, LA. April 6, 2012.

U.S. Dept. of the Interior. Fish and Wildlife Service. 2012b. Endangered species program. Internet website: http://www.fws.gov/endangered/. Accessed April 6, 2012.

Wiese, F.K. and I.L. Jones. 2001. Experimental support for a new drift block design to assess seabird mortality from oil pollution. Auk 118:1062-1068.

Wilhelm, S.I., G.J. Robertson, P.C. Ryan, and D.C. Schneider. 2007. Comparing an estimate of seabirds at risk to a mortality estimate from the November 2004 *Terra Nova* FPSO oil spill. Marine Pollution Bulletin 54:537-544.

Woods & Poole Economics, Inc. 2011. CEDDS 2012: The complete economic and demographic data source on CD-ROM.

APPENDIX A

AIR QUALITY OFFSHORE MODELING ANALYSIS

APPENDIX A. AIR QUALITY OFFSHORE MODELING ANALYSIS

Introduction

This Appendix discusses the coastal dispersion modeling analysis and the potential impacts of offshore emission from the WPA and CPA proposed actions to onshore air quality. The latest version of the Offshore and Coastal Dispersion Model (Version 5.0, dated May 16, 2005) was used to calculate impacts. The objective of the analysis was to determine if the impacts from the proposed actions would significantly affect the environment, particularly public health and public welfare.

Background

The Clean Air Act, which was last amended in 1990, requires the U.S. Environmental Protection Agency (USEPA) to set National Ambient Air Quality Standards (NAAQS, [40 CFR 50]) for pollutants considered harmful to public health and the environment. The USEPA has set NAAQS for six principal pollutants, which are called "criteria" pollutants. These pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, particle pollution (listed as $PM_{2.5}$ and PM_{10}), and sulfur dioxide.

The NAAQS were developed to protect the public health and welfare while allowing for an adequate margin of safety. Primary NAAQS protect the public health including sensitive subpopulations such as infants and the elderly. Secondary NAAQS standards protect public welfare such as the prevention of aquatic acidification, plant leaf damage, or visibility impairment. Thus, for NEPA evaluation purposes, it is reasonable to presume that concentrations of emissions from offshore activities that, following transport to shore, which do not cause exceedances of the NAAQS and are below BOEM's maximum allowable increases, will have minimal impacts to onshore air quality.

The Clean Air Act also established additional protection for pristine national parks and wilderness areas, referred to as Class I areas. In the Gulf of Mexico, the Breton National Wilderness Area is the Class I area most likely to be impacted by OCS activity. When these same emissions from offshore activities are modeled to determine that concentrations at the Breton Class I area are also below BOEM's Class I Significance Levels, it is reasonable to presume for NEPA evaluation purposes that the concentrations of emissions from offshore activities have negligible impacts to the air quality of this pristine Federal area.

The Outer Continental Shelf Lands Act requires the Secretary of the Interior to promulgate and administer regulations for compliance with the NAAQS to the extent that the authorized activities significantly affect the air quality of any state. These regulations apply in the area of the proposed actions and alternatives.

BOEM-regulated pollutants include carbon monoxide (CO), suspended particulates, sulfur dioxide (SO_2), nitrogen oxides (NO_x), and volatile organic compounds (VOC's). The original NAAQS particulate standard was for total suspended particulates (TSP's), which BOEM adopted. This standard has been replaced by USEPA in their regulations with the PM_{10} and $PM_{2.5}$ (particulate matter equal to or below 10 µm and equal to or below 2.5µm in size) because these specific size classifications better define the size range that has the greatest environmental impact. BOEM's regulations use the TSP designation, but for purposes of this NEPA analysis, BOEM determined levels of PM_{10} and $PM_{2.5}$ so that our data are compatible with USEPA's data. This is just one example of where the U.S. Environmental Protection Agency's NAAQS and BOEM's regulations may be somewhat different. As another example, BOEM's regulations employ 3-hour, 24-hour, and annual standards while USEPA has set 1-hour standards to limit pollutant spikes that are not detectable when concentrations are averaged over a longer time period. Both types of particulate designations are included in this Appendix.

BOEM uses a two-level hierarchy of evaluation criteria to evaluate potential impacts of offshore emission sources to onshore areas. The evaluation criteria are the exemption level and the significance level. If the proposed activities exceed the criteria at the first level (exemption level), the evaluation moves to the significance level criteria. The initial evaluation compares the worst-case emissions to the BOEM exemption criteria. If the proposed activity emissions are below the exemption levels, then the proposed activity is exempt from further air quality review.

If the exemption levels are exceeded, then the second step requires refined modeling using coastal dispersion modeling; in this case, the Offshore and Coastal Dispersion Model Version 5. The results of

the model, i.e., the modeled potential onshore impacts, are compared with BOEM's significance levels. If the significance levels are exceeded in an attainment area (i.e., an area that meets the NAAQS), the operator would be required to apply best available control technology to the emissions source. If the affected area is classified as nonattainment, further emission reductions or offsets may be required. Contributions to onshore pollutant concentrations are also subject to the same increments as USEPA applies to onshore areas under their Prevention of Significant Deterioration program.

According to the Clean Air Act Amendments, the air quality in national parks, national wilderness areas, national monuments, and national seashores (42 U.S.C. 7470) must be preserved. The Clean Air Act Amendments establish Class I and II areas, where emissions of particulate matter and sulfur dioxide are to be restricted. The restrictions are most severe in Class I areas and are progressively less restrictive in Class II areas.

Offshore Coastal Dispersion Model

The Offshore and Coastal Dispersion Model Version 5 (OCD 5 model) was developed by USEPA in conjunction with BOEM's predecessor agency, the Minerals Management Service, in the late 1980's, and the model was formally approved for use in January 1988. The OCD 5 model is a coastal dispersion model that was formulated to estimate shoreline concentrations resulting from releases taking place from offshore petroleum drilling platforms. The developers suggest that direct turbulence measurements be used to estimate the dispersion parameters over water. As the plume comes ashore, dispersion is estimated for the effect of transport over land using traditional techniques (Turner and Schulze, 2007).

The OCD 5 model input data comprises source-specific data as well as meteorological data. The source-specific data includes location of activities, emission rate information for all sources associated with activities at the given location, and stack parameters for each source. The model requires both over-land and over-water meteorological data to determine the potential onshore impacts of the offshore operations. These data include overland surface characteristics such as surface roughness and over-water data such as water temperature, over-water air temperature, over-water dew point, over-water wind speed, and over-water wind direction. These data are usually obtained from the offshore buoy closest to the source at three different mixing heights—300 meters, 600 meters, and 900 meters (984 feet, 1,969 feet, and 2,953 feet).

The model parameters are populated by choosing onshore locations (receptors) at which the OCD 5 model will predict the pollutant concentrations of the modeled emission sources. Receptors are identified on the shoreline and at nearby Class I areas. Although the OCD 5 model does not include algorithms for parameters such as regional haze and acid deposition, its relatively simpler data processing makes it an efficient model for use in predicting pollutant impacts from offshore sources.

The OCD 5 model was chosen to analyze the proposed impacts because it performs best when meteorological data is collected over the water. The OCD 5 model was approved for use by the Director of the Minerals Management Service (currently BOEM), and it is listed as an approved air quality model in Appendix W of 40 CFR 51. More recently, BOEM's Director approved the use of the California-PUFF model (CALPUFF), another approved dispersion model listed in Appendix W of 40 CFR 51. However, the OCD 5 model was chosen because BOEM continues to believe it is the more conservative of the two models.

The OCD model does not include a simulation of onshore ozone levels. Several prior studies have demonstrated that OCS activities have only a small contribution to onshore ozone formation. Because the offshore activities' contribution to onshore ozone have been shown to be very small, BOEM chose to run the OCD model. The studies that support this decision include the *Gulf of Mexico Air Quality Study* (Systems Applications International et al., 1995), in which this Agency used the Urban Airshed Model (UAM-V) to assess the potential impacts of OCS activity in the WPA/CPA on USEPA -designated ozone nonattainment areas in urban onshore Texas and Louisiana. Relative to onshore contributors, OCS contributors to onshore ozone formation were low. The *Gulf of Mexico Air Quality Study* was followed by a study in 2000 that used the year 2000 Gulfwide emissions to assess the OCS contribution to onshore ozone in the Houston/Brazoria/Galveston region of Texas. The Comprehensive Air Quality Model with extensions (CAMx) was used to model contribution during an August 2000 ozone episode (Yarwood et al., 2004). The OCS contributions to ozone exceedances were minor. Yarwood et al. (2004) used a photochemical model to analyze the Year 2000 Gulfwide Emissions Inventory (GWEI) and selected the Houston-Galveston-Brazoria nonattainment area since it has the most severe ozone problem in the Gulf of

Mexico region (System Applications International et al., 1995). One of the main relevant findings in Yarwood et al. (2004) is as follow: "The average impact of the year 2000 GWEI emissions on 8-hour ozone levels above 85 ppb in Houston area is 0.2 ppb; although larger impacts may occur over the Gulf of Mexico." Haney et al. (2008) performed a modeling investigation using the year 2000 and year 2005 GWEI's in the WPA and CPA to evaluate the impact of offshore emissions on offshore and onshore ozone air quality, in which they proposed an emission-reduction scenario. They found a particular ozone episode that the onshore impact from all offshore oil-and-gas-related sources was small but generally larger than those estimates using the year 2000 inventory. They noticed higher simulated ozone concentrations from the year 2005 emissions due to increases in NO_x and VOC concentrations.

A second follow-up study was conducted in 2008 using the updated year 2005 Gulfwide Emission Inventory Study to model ozone formation in Louisiana, Mississippi, Alabama, and Florida based on an August 1999 ozone episode (Haney et al., 2008). In this study, OCS oil and gas activity contributed only slightly to the simulated onshore ozone exceedances.

OCD Model Protocol

The OCD 5 model was used to analyze the WPA and CPA proposed actions' impacts on the onshore community. BOEM's regulations at 30 CFR 550.303 cite that an approved model should be used to assess impacts. The USEPA lists approved models in 40 CFR Chapter 1, Part 51, Appendix W 7.2.4., "Modeling Guidance for Other Governmental Programs." The model was used to compute concentrations of sulfur dioxide (SO_2), nitrogen oxides (NO_x), volatile organic carbon compounds (VOC's), carbon monoxide (CO), and particulate matter below 10 micrometers (PM_{10}) and below 2.5 micrometers ($PM_{2.5}$) in size.

BOEM's regulations do not include ozone as it is not directly emitted into the air from OCS oil and gas activities. BOEM does regulate the pollutants, VOC and NO_2, which are precursors to ozone. Ozone formation from VOC's and NO_2 is dependent upon a photochemical reaction in the ambient air that includes heat and sunlight. Ozone formation is a problem in onshore urban areas with many sources of pollutants. The OCD model cannot simulate ozone generation. Several studies that BOEM has conducted and that are discussed above have shown that OCS activities are only a small contributor to onshore ozone exceedance so there was no need to perform ozone modeling. Estimates of the amount of activity that will result from the proposed WPA or CPA lease sale were made using the scenarios for both individual typical lease sales and all cumulative OCS activities in the WPA and CPA (**Tables 3-2, 3-3, 3-5, and 3-6** of this Supplemental EIS). BOEM can attribute an amount of emissions generated by each activity through information collected in the *Year 2008 Gulfwide Emission Inventory Study* (Wilson et al., 2010) and Rigzone (2009). A spreadsheet was developed based on the findings of this study (Billings et al., official communication, 2012). Using the level of activity and the activity's known emissions, total emissions were determined for each type of activity for each of the 40 years of the analysis period for the WPA and CPA proposed actions.

Yearly emissions from all of these activities and sources were summed together and modeled: exploration and delineation drilling; development and production drilling; platform installation and removal; pipeline installation; production platform operations; tanker loading; tanker in transit; tanker unloading; and helicopters and support vessels. Drilling comprises approximately 60-75 percent of the total emissions. Emissions for the year with the highest annual emissions during the 40-year analysis period (tons/year) and the cumulative sum of all emissions from all OCS-related activities in the WPA and CPA during the 40-year analysis period (tons) are shown in **Tables A-1 through A-4**. The data in the EIS spreadsheets were based on an average drillship as reported in the *Year 2008 Gulfwide Emission Inventory Study* (Wilson et al., 2010) and Rigzone (2009) for the Gulf of Mexico. Drilling days and average kilowatts were used to calculate reasonably foreseeable emissions. Specific drillships can be significantly larger or smaller than the average value used in the spreadsheet and greater total emissions could be generated if the drillship stays on location longer. These averages may not, in every situation, directly translate to the short-term (as opposed to annual) NAAQS; nevertheless, BOEM's subject-matter experts believe that the analysis remains conservative with regards to reasonably foreseeable emissions expected to result from WPA and CPA proposed actions.

In response to the FY 2008 Consolidated Appropriations Act, USEPA issued 40 CFR 98, which requires reporting of greenhouse gas emissions. Subpart W of the Greenhouse Gas Reporting Rule requires petroleum and natural gas facilities that emit 25,000 metric tons or more of CO_2 equivalents per

year to report emissions from equipment leaks and venting. On average, the amount of CO_2 emissions from a typical well site is about 237-439 tons per year. Subpart C of the Green House Gas Reporting Rule requires operators to report greenhouse gas emissions from general stationary fuel combustion sources to USEPA. At this point this is just a reporting requirement; there are no specific NAAQS or emission limitations for greenhouse gases.

BOEM has included modeled estimates for certain greenhouse gases that may be directly emitted during OCS oil and gas activities in this Appendix. At this time, the greenhouse gas emissions related to OCS oil and gas activities are a very small percentage of the national emissions, and it would be impossible to tease out the impacts from this small incremental addition from global climate change impacts attributable to all other global sources. As such, BOEM does not believe that the potential greenhouse gas emissions directly attributable to oil and gas activities on the OCS as a result of the WPA or CPA proposed action are significant to global greenhouse gas levels.

The single sale projected emissions were then assigned to a block within the WPA or CPA for OCD 5 modeling. Modeling emissions from cumulative sales was not performed because although the cumulative emissions are greater than the lease sale emissions, the emissions would be widely distributed across the planning areas and would be the result of activities based on all stages of the life of the lease. Since drilling is the activity with the greatest emissions and is most concentrated in a new lease, modeling for a single lease sale was considered sufficient. At the time of the WPA or CPA lease sale, BOEM can only generally predict where or when the activities that generate air pollutants will occur during the 40-year analysis period within the planning areas. Of the various types of drilling rigs, the drillship was chosen because it generates the greatest amount of emissions since it is not anchored to the seafloor. Instead, the drillship depends on engines to stay on location. Thus, the drillship's emissions result from both drilling and the thrusters used to maintain location. A drillship generates 773 tons of NO_x per well whereas a jack-up rig generates 47 tons of NO_x per well. The selected CPA source (Mississippi Canyon Block 856 [MC 856]) is about 56 miles (90 kilometers) from the closest shoreline and 95 miles (153 kilometers) from the Breton Class I area, while the selected WPA source (East Breaks Block 446 [EB 446]) is about 80 miles (129 kilometers) from the closest shoreline. No Class I area is within 300 kilometers (186 miles) of EB 446, so no EB 446 Class I modeling was performed. All of the emissions from the year with the highest activity were placed in one location rather than distributed across the proposed WPA and CPA lease sale areas. The modeling scenarios are presented in **Table A-5**.

The meteorological data used are described in BOEM's *Five-Year Meteorological Datasets for CALMET/CALPUFF and OCD5 Modeling of the Gulf of Mexico Region* (Douglas and Hudischewskyj, 2008). The meteorological files to use in the OCD 5 model were prepared using onshore surface and upper-air data from the National Weather Service, mixing height estimates obtained from the National Climatic Data Center, and offshore buoy data from the National Data Buoy Center (Douglas and Hudischewskyj, 2008). The meteorological data used were from the period 2000 through 2004. Different meteorological data were applied to each site. For EB 446, the meteorological data were from Corpus Christi, Texas, for both surface and upper air, as well as Buoy 42019. For MC 856, surface data come from Patterson, Louisiana, and upper air data come from Slidell, Louisiana. Buoy data for MC 856 come from Buoy 42040. These meteorological data points are the closest, physically, to the proposed lease sale areas available to BOEM and, therefore, are the best approximation available.

The modeling domain was selected to include the closest shoreline area potentially impacted by emissions. Receptors were set at the Breton Class I area and the shoreline for the CPA and at the shoreline for the WPA. State's shorelines and the Breton Class I area were included. For the EB 446 source, 20 Texas onshore receptors were used. For the MC 856 source, 2 Florida, 3 Alabama, 3 Mississippi, 17 Louisiana, and 10 Breton Class I receptors were used.

Limitations

There are limitations associated with this modeling effort. Other models could have been used instead of the OCD 5 model. These other models would possibly include determination of ozone formation that the OCD 5 model does not include. Vessel emissions were represented as a stationary source when, in reality, they would be moving between the shore base and the proposed lease sale areas. Furthermore, a more realistic estimation of shoreline impacts could have been obtained by distributing the sources of emissions across the OCS rather than using the assumption that all emissions occur at a single location in the CPA (MC856) and WPA (EB446). Results are not available for every point on the coast.

The inclusion of more receptor locations would provide greater detail to the results. Modeling did not include every type of exploration and production activity or accidental event. Modeling did not include drilling at a location closer to shore with emissions representative of a more appropriate bottom-founded rig.

Nevertheless, by using a reasonable conservative approach, which includes the overestimation of reasonable emissions, and attribution of the source of these emissions to a single point in each of the proposed lease sale areas rather than at more dispersed source points throughout the proposed lease sale areas, and by using the conservative OCD 5 model, which is specifically designed to represent the offshore and coastal environment, the results of this modeling effort adequately represent a demonstration of the impacts of offshore emissions to the shoreline and to the Class I area.

OCD Model Results

The OCS emissions for the criteria pollutants as a result of the WPA and CPA proposed actions are based on the *Year 2008 Gulfwide Emission Inventory Study* (Wilson et al., 2010) and Billings et al. (official communication, 2012). The major pollutant emitted is NO_x, while PM_{10} is the least emitted pollutant. Platform operations are contributors of VOC emissions. Commercial marine vessels are contributors of SO_2 and PM emissions. Support activities for OCS activities including crew and supply boats, helicopters, and pipeline vessels consist mainly of NO_x and CO emissions. Combustion-intensive operations such as platform operations, well drilling, and service-vessel activities contribute mostly to NO_x.

Since NO_x has the highest potential emissions for OCS activities, annual NO_2 and 1-hour NO_2 were analyzed and compared with the NAAQS. To be conservative, all emissions of NO_x were assumed to be equal to NO_2 for modeling purposes. Results are provided in **Table A-6** for the CPA Class I and Class II areas and for the WPA Class II area.

CPA

The results for the Class I Breton National Wilderness Area also demonstrate that the CPA proposed action modeled impacts are below BOEM's Significance Levels and Maximum Allowable Increases, NAAQS, and the U.S. Environmental Protection Agency's SIL's for all the criteria pollutants except for the annual NO_x and the 24-hour $PM_{2.5}$. Although the SIL's were exceeded, BOEM expects in practice, if the emissions were distributed more realistically across the CPA, that emissions would not exceed the SIL; and thus, actual emissions likely to result from the CPA proposed action would likely not be significant. The modeling that was conducted was overly conservative. All the emissions during 1 year for the entire CPA, which would actually be dispersed throughout the CPA, were modeled as if they originated in Mississippi Canyon Block 856. BOEM is confident that the modeled impacts from OCS activity continue to support its conclusion that the proposed action will only minimally impact onshore air quality.

The results for the Class II area also demonstrate that the CPA proposed action modeled impacts are below BOEM's Significance Levels and Maximum Allowable Increases, NAAQS, and the U.S. Environmental Protection Agency's SIL's for all the criteria pollutants except for the annual NO_x and the 24-hour $PM_{2.5}$. Although the SIL's were exceeded, BOEM expects in practice, if the emissions were distributed more realistically across the CPA, that emissions would not exceed the SIL; and thus, actual emissions likely to result from the CPA proposed action would likely not be significant. The modeling that was conducted was overly conservative. All the emissions during 1 year for the entire CPA, which would actually be dispersed throughout the CPA, were modeled as if they originated in Mississippi Canyon Block 856. BOEM is confident that the modeled impacts from OCS activity continue to support its conclusion that the proposed action will only minimally impact onshore air quality.

The results also indicate that the maximum modeled concentrations for the 1-hour averaging period for the NO_2 combined with the nearest representative onshore NO_2 monitored concentrations do not exceed the NO_2 1-hour NAAQS for the Breton National Wilderness Area as well as for the entire CPA (**Table A-6**). Although BOEM's regulations do not include a 1-hour NO_2 standard, BOEM modeled 1-hour NO_2 impacts from the CPA proposed action because the 1-hour standard is harder to meet than BOEM's annual NO_x maximum allowable increase. The results of the modeled impacts support the conclusion that there will be minimal impacts to onshore air quality.

WPA

The OCD 5 modeling results indicate that the WPA proposed action's operations will not cause an exceedance of the NAAQS for any pollutant in any onshore area. Since the modeled impacts are lower than the NAAQS and studies have shown only a slight contribution to onshore ozone at study locations adjacent to the CPA and WPA, BOEM is confident that the proposed activities for the CPA and WPA will only minimally impact onshore air quality.

The results for the Class II area also demonstrate that the WPA proposed action does not exceed BOEM's Significance Levels and Maximum Allowable Increases, NAAQS, and the U.S. Environmental Protection Agency's SIL's for annual, 24-hour, and 3-hour SO_2; annual and 24-hour PM_{10} and $PM_{2.5}$; and annual and 1-hour NO_2 (**Table A-6**). BOEM feels confident that the modeled impacts from OCS activity will minimally impact onshore air quality.

The results also indicate that the maximum modeled concentrations for the 1-hour averaging period for the NO_2 combined with the nearest representative onshore NO_2 monitored concentrations do not exceed the NO_2 1-hour NAAQS the entire WPA (**Table A-6**). The results of the modeled impacts support the conclusion that there will be minimal impacts to onshore air quality.

Conclusion

Based on studies conducted in 1995, 2000, and 2008, BOEM has determined that OCS activities contributed only slightly to onshore ozone exceedances in the Houston/Brazoria/Galveston areas of Texas, and the States of Louisiana, Mississippi, Alabama, and Florida. Consequently, ozone modeling was not performed for this analysis. The OCD model was selected to model for the pollutants CO, NO_x, SO_x, $PM_{2.5}$, and PM_{10}. BOEM used a conservative approach in choosing and populating the OCD model for this analysis, which includes the overestimation of reasonable emissions and the attribution of the source of these emissions to a single point in each of the proposed lease sale areas rather than at more realistic source points throughout the proposed lease sale areas. The conservative OCD 5 model is specifically designed to represent the offshore and coastal environments. The results of this modeling effort adequately represent a demonstration of the impacts of offshore emissions to the shoreline and to the Class I area.

The OCD 5 modeling was performed for the CPA Class I area and the CPA and WPA Class II areas. The CPA hypothetical source location was chosen approximately 56 miles (90 kilometers) from shore, while the WPA hypothetical source location was chosen approximately 80 miles (129 kilometers) from shore. Even with all the emissions being attributed to a single point, which would not be the case in reality, both CPA and WPA emissions would minimally impact onshore air quality. Significant impacts to air quality are not expected to result from the WPA and CPA proposed actions.

Preparers

Margaret Metcalf, Supervisor, Physical Sciences Unit
Stacie Merritt, Physical Scientist
Chester Huang, Meteorologist
Eric Wolvovsky, Physical Scientist

References

Billings, R., B. Lange, and D. Wilson. 2012. Official communication. Emission estimates for Eastern Planning Area Sales 225-226. Memorandum to Holli Ensz, U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. Eastern Research Group, Inc., September 7, 2012. 9 pp.

Douglas, S.G. and A.B. Hudischewskyj. 2008. Five-year meteorological datasets for CALMET/CALPUFF and OCD5 modeling of the Gulf of Mexico Region. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2008-029. 53 pp.

Haney, J.L., Y. Wei, T. Myers, and S. Douglas. 2008 (unpublished). An assessment of onshore air quality impacts for the eastern Gulf Coast (Louisiana to Florida) using the 2005 Gulfwide emissions inventory. Prepared for the U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA.

Rigzone. 2009. Offshore rig search. Internet website: http://www.rigzone.com. Accessed February 26, 2013.

Systems Applications International, Sonoma Technology, Inc., Earth Tech, Alpine Geophysics, and A.T. Kearney. 1995. Gulf of Mexico air quality study: Final report. Volumes I-III. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 95-0038, 95-0039, and 95-0040. 650, 214, and 190 pp., respectively.

Turner, D.B. and R.H. Schulze. 2007. Practical guide to atmospheric dispersion modeling. Dallas, TX: Trinity Consultants.

Wilson, D.L., R, Billing, R. Oommen, and B. Lange. 2010. Year 2008 Gulfwide emission inventory study. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEMRE 2010-045. 185 pp.

Yarwood, G., G. Mansell, M. Jimenez, and S. Lau. 2004 (unpublished). 2000 Gulf-wide emissions inventory – OCS on-shore impacts modeling (Texas), a preliminary look. Prepared for the U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. Prepared by ENVIRON International Corporation, Novato, CA. September 1, 2004.

Table A-1

Central Planning Area – Estimate of High-Case Emissions for Cumulative Sales: Total Emissions during the 40-Year Period of Activity (tons)

	NO_x	SO_x	PM_{10}	$PM_{2.5}$	VOC	CO	CO_2	CH_4	N_2O
Exploration/Delineation Well Drilling	1,418,906.52	3,797.42	47,632.79	46,203.81	28,854.46	347,702.69	126,296,548.05	1,058.08	3,799.01
Development/Production Well Drilling	1,73,8078.63	2,390.40	58,097.52	56,354.60	35,394.37	428,711.63	156,091,192.49	1,307.67	4,694.93
Platform Installation and Removal	59,513.87	126.70	2,053.02	1,991.43	869.36	15,726.68	4,698,377.58	27.67	214.46
Pipeline Installation	60,497.90	177.59	1,728.99	1,677.12	1,770.85	12,456.98	6,432,426.19	75.80	293.74
Production Platforms	2,192,552.79	30,138.08	23,021.72	22,697.05	1,788,929.87	2,424,540.85	248,432,794.68	12,457,138.92	3,694.40
Tankers Loading	7.71	0.11	0.19	0.17	1,774.84	0.76	336.78	0.00	0.01
Tankers in Transit	285.97	4.01	7.02	6.43	32.81	28.31	12,484.17	0.06	0.50
Tankers Unloading	7.71	0.08	1.89E-01	1.73E-01	545.14	0.76	336.78	0.0035	0.0134
Helicopters	22,772.43	5,616.57	4.49E+03	4.49E+03	55,426.98	277,657.75	28,085,285.00	0.0000	0.00
Support Vessels	1,233,296.32	1,059.64	4.23E+04	4.10E+04	18,047.48	328,241.63	98,199,575.43	597.3796	4,482.4038
Total	6,725,919.86	43,310.60	179,321.24	174,442.00	1,931,646.16	3,835,068.04	668,249,357.14	12,460,205.60	17,179.46

Table A-2

Western Planning Area – Estimate of High-Case Emissions for Cumulative Sales: Total Emissions during the 40-Year Period of Activity (tons)

	NO_x	SO_x	PM_{10}	$PM_{2.5}$	VOC	CO	CO_2	CH_4	N_2O
Exploration/Delineation Well Drilling	212,627.91	588.41	6,898.71	6,691.75	4,751.91	50,226.01	19,750,173.14	182.79	471.18
Development/Production Well Drilling	267,289.55	384.51	8,642.95	8,383.66	5,957.54	63,605.21	25,011,716.80	230.74	602.75
Platform Installation and Removal	13,556.96	31.04	468.03	453.99	197.99	3,579.21	1,069,106.32	6.30	48.80
Pipeline Installation	13,064.57	39.80	373.55	362.34	382.46	2,689.21	1,388,128.00	16.36	63.39
Production Platforms	521,898.09	7,173.83	5,479.91	5,402.63	425,822.85	577,118.71	59,134,996.35	2,965,199.77	879.38
Tankers Loading	1.55	0.03	0.04	0.03	357.07	0.15	67.75	0.00	0.00
Tankers in Transit	57.53	1.00	1.41	1.29	6.60	5.70	2,511.61	0.01	0.10
Tankers Unloading	1.55	0.02	0.04	0.03	109.67	0.15	67.75	0.00	0.00
Helicopters	5,347.68	1,318.95	1,055.24	1,055.24	13,016.00	65,202.78	6,595,308.50	-	-
Support Vessels	244,823.09	210.35	8,394.28	8,142.45	3,582.63	65,159.63	19,493,712.24	118.59	889.81
Total	1,278,668.48	9,747.95	31,314.15	30,493.42	454,184.72	827,586.75	132,445,788.48	2,965,754.55	2,955.42

Table A-3

Central Planning Area – Estimate of High-Case Emissions for a Single Sale: Highest Year of Emissions during the 40-Year Period of Activity (tons/year)

	NO_x	SO_x	PM_{10}	$PM_{2.5}$	VOC	CO	CO_2	CH_4	N_2O
Exploration/Delineation Well Drilling	10,568.34	246.01	380.32	368.91	207.04	2,327.83	802,296.17	6.63	24.85
Development/Production Well Drilling	4,561.63	5.02	152.84	148.26	91.83	1,133.34	408,984.93	3.38	12.67
Platform Installation and Removal	216.56	2.73	7.42	7.20	3.17	57.68	17,257.87	0.10	0.79
Pipeline Installation	133.88	1.85	3.79	3.68	3.91	27.73	14,406.80	0.17	0.66
Production Platforms	3,157.65	43.40	33.16	32.69	2,576.37	3,491.76	357,786.08	17,940.43	5.32
Tankers Loading	0.14	0.02	0.0034	0.0031	31.51	0.0136	5.98	6.16E-05	0.0002
Tankers in Transit	5.08	0.60	0.12	0.11	0.58	0.50	221.61	0.0011	0.01
Tankers Unloading	0.14	0.01	0.0034	0.0031	9.68	0.0136	5.98	6.16E-05	0.0002
Helicopters	33.5310	8.2700	6.6166	6.6166	81.6128	408.83	41,353.82	0.00E+00	0.00E+00
Support Vessels	2,038.47	2.49	69.85	67.76	29.84	542.92	162,447.60	0.99	7.42
Total	20,715.42	310.41	654.13	635.23	3,035.54	7,990.61	1,804,766.85	17,951.70	51.71

Table A-4

Western Planning Area – Estimate of High-Case Emissions for a Single Sale: Highest Year of Emissions during the 40-Year Period of Activity (tons/year)

	NO_x	SO_x	PM_{10}	$PM_{2.5}$	VOC	CO	CO_2	CH_4	N_2O
Exploration/Delineation Well Drilling	2,325.06	56.25	81.48	79.03	50.66	497.66	183,442.18	1.67	4.61
Development/Production Well Drilling	803.88	0.69	26.11	25.33	17.62	193.15	74,920.80	0.68	1.91
Platform Installation and Removal	178.29	1.86	6.11	5.93	2.61	47.48	14,207.85	0.08	0.65
Pipeline Installation	58.14	1.61	1.83	1.78	1.74	11.10	5,233.78	0.06	0.24
Production Platforms	1,038.41	14.27	10.90	10.75	847.25	1,148.28	117,659.30	5,899.78	1.75
Tankers Loading	0.05	0.01	0.0011	0.0010	10.50	0.0045	1.99	2.05E-05	0.0001
Tankers in Transit	1.69	0.20	0.04	0.04	0.19	0.17	73.87	0.0004	0.00
Tankers Unloading	0.05	0.01	0.0011	0.0010	3.23	0.0045	1.99	2.05E-05	0.0001
Helicopters	11.1770	2.7567	2.2055	2.2055	27.2043	136.28	13,784.61	0.00E+00	0.00E+00
Support Vessels	910.03	1.11	31.18	30.25	13.32	242.38	72,521.25	0.44	3.31
TOTAL	5,326.77	78.76	159.87	155.31	974.33	2,276.50	481,847.63	5,902.72	12.48

Table A-5

Modeling Scenarios

Modeling Scenarios	Source Location		Activity Represented	NO_x (g/sec)	SO_x (g/sec)	PM_{10} (g/sec)	$PM_{2.5}$ (g/sec)	VOC (g/sec)	CO (g/sec)
	Area	Area/ Block							
1	CPA	MC 856	All activity during the year with the highest lease sale emissions	595.9	8.9	18.8	18.3	87.3	229.9
2	WPA	EB 446	All activity during the year with the highest lease sale emissions	153.2	2.2	4.6	4.5	28.0	65.5

CO – carbon monoxide
CPA – Central Planning Area
EB – East Breaks
g/sec – grams per second
MC – Mississippi Canyon
NO_x – nitrogen oxides
PM_{10} – particulate material less than 10µm in size
$PM_{2.5}$ – particulate material less than 2.5µm in size
SO_x – sulfur oxides
WPA – Western Planning Area
VOC – volatile organic compound

Table A-6

OCD Modeling Results for the WPA and CPA Proposed Actions Compared with USEPA's Significance Impact Levels and the NAAQS

Pollutant	Averaging Times	BOEM Significance Levels ($\mu g/m^3$)	BOEM Maximum Allowable Increases ($\mu g/m^3$)		NAAQS ($\mu g/m^3$)	USEPA PSD Significance Impact Levels ($\mu g/m^3$)		BOEM Modeled Impacts CPA ($\mu g/m^3$)		BOEM Modeled Impacts WPA ($\mu g/m^3$)
			Class I	Class II		Class I	Class II	Class I	Class II	Class II
CO	8-hour	500	None	None	10,000	None	500	None	None	None
	1-hour	2,000	None	None	40,000	None	2,000	None	None	None
NO_2	Annual	1	None	None	100	0.1	1	0.4	0.6	0.3
	1-hour	None	None	None	188	TBD	7.5[a]	55.4[b]	177.67[c]	120.67[c]
SO_2	Annual	1	2	20	80[d]	0.1	1	0.01	0.0	0.0
	24-hour	5	5	91	365[d]	0.2	5	0.1	0.2	0.0
	3-hour	25	2	512	1,300	1	25	0.5	0.5	0.2
	1-hour	None	None	None	196	TBD	7.86[a]	0.8	1.3	0.4
$PM_{2.5}$[e]	Annual	1	5	19	12	0.06	0.3	0.0	0.0	0.0
	24-hour	5	10	37	35	0.07	1.2	0.3	0.4	0.1
PM_{10}[e]	Annual					0.2	1	0.0	0.0	0.0
	24-hour					0.3	5	0.3	0.4	0.1

Note: All units have been converted to $\mu g/m^3$.

[a] Interim Significant Impact Level.

[b] No background NO_2 concentration available for the Breton National Wilderness Area.

[c] Determined by adding modeled concentration to Kenner, Louisiana, 1-hour NO_x monitor background ($94.07 \mu g/m^3$) and compared with the NAAQS.

[d] To be revoked 1 year after designations for the 1-hour standard.

[e] BOEM's total suspended particulate regulatory value has been inserted as a substitute for $PM_{2.5}$ and PM_{10}.

CO—carbon monoxide
NAAQS—National Ambient Air Quality Standards
NO_2—nitrogen dioxide
PM_{10}—particulate material less than 10 µm in size
$PM_{2.5}$—particulate material less than 2.5 µm in size
PSD—Prevention of Significant Deterioration
SO_2—sulfur dioxide
TBD—to be determined

KEYWORD INDEX

KEYWORD INDEX

The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the sound use of our land and water resources, protecting our fish, wildlife and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island communities.

The Bureau of Ocean Energy Management

The Bureau of Ocean Energy Management (BOEM) works to manage the exploration and development of the nation's offshore resources in a way that appropriately balances economic development, energy independence, and environmental protection through oil and gas leases, renewable energy development and environmental reviews and studies.