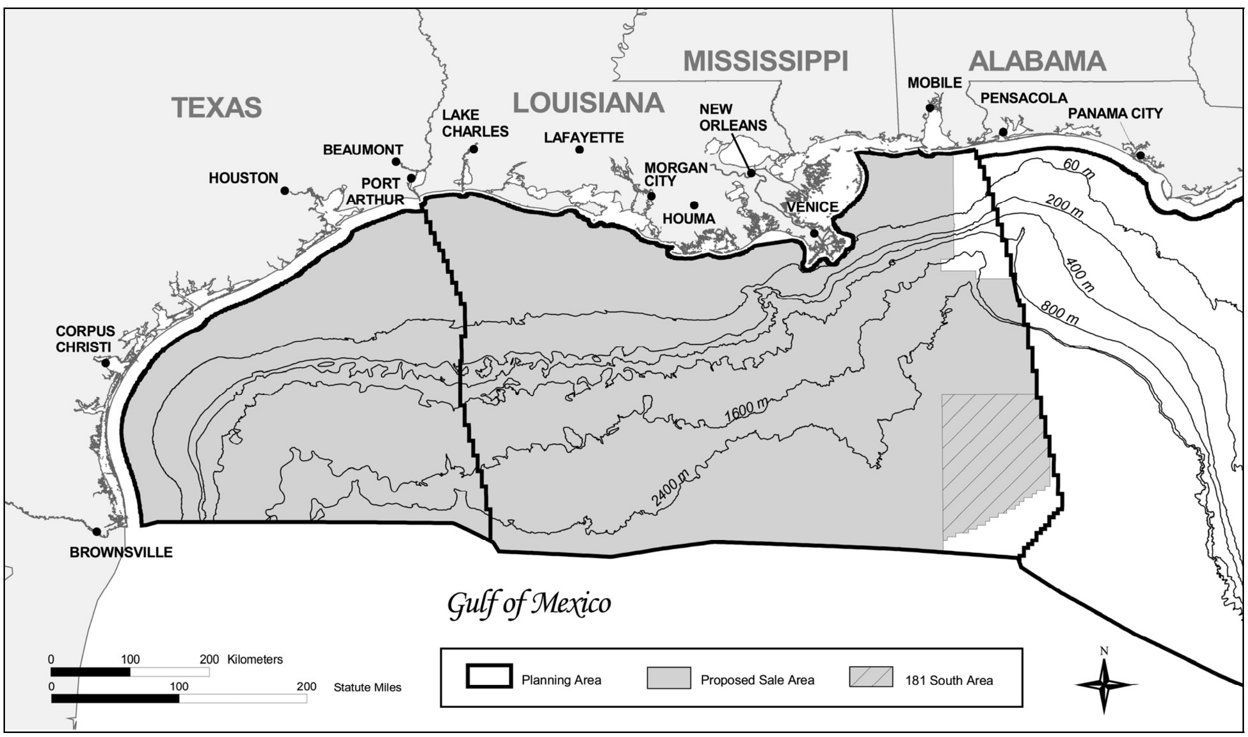
OCS EIS/EA
MMS 2008-041

Gulf of Mexico OCS Oil and Gas Lease Sales: 2009-2012

Central Planning Area Sales 208, 213, 216, and 222
Western Planning Area Sales 210, 215, and 218

Final Supplemental Environmental Impact Statement



U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Region

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REGIONAL DIRECTOR'S NOTE

In the *Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012,* six annual areawide lease sales are scheduled for the Central Planning Area and five annual areawide lease sales are scheduled for the Western Planning Area. Federal regulations allow for several related or similar proposals to be analyzed in one environmental impact statement (EIS) (40 CFR 1502.4). Since each lease sale proposal and projected activities are very similar each year for each sale area, the Minerals Management Service (MMS) prepared a single EIS for the 11 lease sales: *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* (Multisale EIS).

The Gulf of Mexico Energy Security Act of 2006 (P.L. 109-432, December 20, 2006) repealed the Congressional moratorium on certain areas of the Gulf of Mexico. One of those areas, the 181 South Area, was not analyzed in the Multisale EIS. Therefore, MMS has prepared this Supplemental EIS to analyze the potential environmental effects of oil and natural gas leasing, exploration, development, and production in the 181 South Area for the proposed Central Planning Area sales. This Supplemental EIS also analyzes any new information available for the remaining seven Central and Western Planning Area sales since the publication of the Multisale EIS.

At the completion of this Supplemental EIS process, decisions will be made only for proposed Lease Sale 208 in the CPA and proposed Lease Sale 210 in the WPA. An environmental analysis will be prepared for each subsequent proposed lease sale. By eliminating essentially duplicate EIS's, MMS will be able to focus the subsequent environmental reviews on any new or changing issues or impacts.

The Gulf of Mexico Outer Continental Shelf (OCS) Region of MMS has been conducting environmental analyses of the effects of OCS oil and gas development since the inception of the National Environmental Policy Act of 1969. We have prepared and published more than 50 draft and 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.

Lars Herbst

Lars Herbst
Regional Director
Minerals Management Service
Gulf of Mexico OCS Region

COVER SHEET

Supplemental Environmental Impact Statement
for Proposed Central Planning Area OCS Oil and Gas Lease Sales 208, 213, 216, and 222,
and Proposed Western Planning Area OCS Oil and Gas Lease Sales 210, 215, and 218

	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:	**Washington Contact:**	**Region Contacts:**
U.S. Department of the Interior Minerals Management Service Gulf of Mexico OCS Region MS 5410 1201 Elmwood Park Boulevard New Orleans, LA 70123-2394	Mary Boatman (MS 4042) U.S. Department of the Interior Minerals Management Service 381 Elden Street Herndon, VA 20170-4817 (703) 787-1662	Casey Rowe (504) 736-2781 Gary Goeke (504) 736-3233 Dennis Chew (504) 736-2793

ABSTRACT

This Final Supplemental Environmental Impact Statement (SEIS) covers the proposed 2009-2012 Gulf of Mexico OCS oil and gas lease sales in the Central and Western Planning Areas. The proposed Central Planning Area lease sales are Sale 208 in 2009, Sale 213 in 2010, Sale 216 in 2011, and Sale 222 in 2012; and the proposed Western Planning Area lease sales are Sale 210 in 2009, Sale 215 in 2010, and Sale 218 in 2011.

This SEIS supplements the *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* (Multisale EIS). The Gulf of Mexico Energy Security Act of 2006 (P.L. 109-432, December 20, 2006) repeals the Congressional moratorium on certain areas of the Gulf of Mexico. One of those areas, the 181 South Area, was not analyzed in the Multisale EIS. Therefore, MMS has prepared this SEIS to analyze the potential environmental effects of oil and natural gas leasing, exploration, development, and production in the 181 South Area for the proposed Central Planning Area sales. This SEIS also analyzes any new information available for the Central and Western Planning Areas since the publication of the Multisale EIS.

The proposed actions are 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 proposal. 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 a proposed action is adopted. Activities and disturbances associated with a proposed action on biological, physical, and socioeconomic resources are considered in the analyses.

Additional copies of this SEIS, the Multisale EIS, and the other referenced MMS publications may be obtained from the MMS, Gulf of Mexico OCS Region, Public Information Office (MS 5034), 1201 Elmwood Park Boulevard, New Orleans, Louisiana 70123-2394, or by telephone at 504-736-2519 or 1-800-200-GULF.

SUMMARY

Under the *Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012* (5-Year Program; USDOI, MMS, 2007a), six annual areawide lease sales are scheduled for the Central Planning Area (CPA) and five annual areawide lease sales are scheduled for the Western Planning Area (WPA) of the Gulf of Mexico Outer Continental Shelf (OCS). Those 11 CPA and WPA sales were analyzed in the *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* (Multisale EIS; USDOI, MMS, 2007b) and are hereby incorporated by reference.

The Gulf of Mexico Energy Security Act (GOMESA) of 2006 (P.L. 109-432, December 20, 2006) repeals the Congressional moratorium on certain areas of the Gulf of Mexico, places a moratorium on other areas in the Gulf of Mexico, and increases the distribution of offshore oil and gas revenues to coastal States.

One of the areas the GOMESA defines is referred to as the 181 South Area (**Figure 1-1**). This area is located in the CPA and is approximately 5.8 million acres (ac). The Minerals Management Service (MMS) is proposing the sale area for proposed CPA Sales 208 (2009), 213 (2010), 216 (2011), and 222 (2012) be expanded to include 4.3 million ac of the 181 South Area. The remaining acreage of the 181 South Area (1.5 million ac) is located beyond the U.S. Exclusive Economic Zone (EEZ) and, therefore, would not be offered. While GOMESA repealed the Congressional moratorium on the 181 South Area in December 2006, MMS has decided, because of the limited geological and geophysical data available to industry and the limited environmental review for this area, it would be premature to offer this area prior to Sale 208 (2009). The Multisale EIS did not include the 181 South Area. Therefore, MMS has performed this separate National Environmental Policy Act (NEPA) review to reevaluate the expanded CPA sale area.

This supplemental environmental impact statement (SEIS) supplements the Multisale EIS. Not only does this SEIS analyze the potential environmental effects of oil and natural gas leasing, exploration, development, and production in the 181 South Area for the proposed CPA sales, but it also analyzes any and all new information available for the CPA and WPA since the publication of the Multisale EIS.

The proposed Federal actions addressed in this SEIS are the remaining seven areawide oil and gas lease sales in the CPA and WPA. The proposed CPA lease sales are Sale 208 in 2009, Sale 213 in 2010, Sale 216 in 2011, and Sale 222 in 2012; the proposed WPA lease sales are Sale 210 in 2009, Sale 215 in 2010, and Sale 218 in 2011.

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 SEIS. 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 SEIS as described below.

- **Chapter 1**, The Proposed Actions, describes the purpose of and need for the proposed lease sales and describes the prelease process.
- **Chapter 2**, Alternatives Including the Proposed Actions, describes the environmental and socioeconomic effects of the proposed lease sales and alternatives. Also discussed are potential mitigation 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 Events, 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 a proposed lease sale.

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, which may affect the biological, physical, and socioeconomic resources of the Gulf of Mexico.

- **Chapter 4**, Environmental and Socioeconomic Consequences, describes the analysis of the routine, accidental, and cumulative impacts of a CPA or WPA proposed action and the alternatives on environmental and socioeconomic resources of the Gulf of Mexico.

  Chapter 4.1, Alternative A—The Proposed Actions, describes the impacts of Alternative A on the biological, physical, and socioeconomic resources of the Gulf of Mexico.

  Chapter 4.2, Alternatives to the Proposed Actions, describes the impacts of the three alternatives to the proposed action in the CPA and two alternatives to the proposed action in the WPA 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 SEIS.
- **Chapter 6**, References, is a list of literature cited throughout this SEIS.
- **Chapter 7**, Preparers, is a list of names of persons who were primarily responsible for preparing and reviewing this SEIS.

Proposed Actions and Alternatives

The following alternatives were included for analysis in the Multisale EIS. As explained in **Chapter 2.1.3.2**, the Use of a Nomination and Tract Selection Leasing System Alternative was not included for analysis in this SEIS due to an ongoing MMS study on alternative approaches to leasing. No new alternatives were proposed due to the addition of the 181 South Area to the proposed CPA lease sales.

Alternatives for Proposed Central Planning Area Sales 208, 213, 216, and 222

Alternative A—The Proposed Actions: This alternative would offer for lease all unleased blocks within the CPA for oil and gas operations (**Figure 2-1**), except the following:

(1) blocks that were previously included within the Eastern Planning Area (EPA) and that are within 100 miles (mi) (161 kilometers (km)) of the Florida coast;

(2) blocks that are beyond the U.S. Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap; and

(3) for Sales 208 and 213 only, whole and partial blocks that lie within the 1.4-nautical mile (nmi) buffer zone north of the continental shelf boundary between the U.S. and Mexico.

The CPA sale area encompasses about 63 million ac of the CPA's 66.3 million ac. Approximately 37.1 million ac (59%) of the CPA sale area is currently unleased. The estimated amount of resources projected to be developed as a result of any one proposed CPA lease sale is 0.807-1.336 billion barrels of oil (BBO) and 3.365-5.405 trillion cubic feet (Tcf) of gas.

Alternative B—The Proposed Actions Excluding the Unleased Blocks Near Biologically Sensitive Topographic Features: This alternative would offer for lease all unleased blocks in the CPA sale area, as described for the proposed actions, with the exception of any unleased blocks subject to the Topographic Features Stipulation.

Alternative C—The Proposed Actions Excluding the Unleased Blocks within 15 Miles of the Baldwin County, Alabama, Coast: This alternative would offer for lease all unleased blocks in the CPA sale area, as described for the proposed actions, with the exception of any unleased blocks within 15 mi (24 km) of the Baldwin County, Alabama, coast.

Alternative D—No Action: This alternative is the cancellation of one or more proposed CPA lease sales. The opportunity for development of the estimated 0.807-1.336 BBO and 3.365-5.405 Tcf of gas that could have resulted from a proposed CPA lease sale would be precluded or postponed. Any potential environmental impacts resulting from a proposed lease sale would not occur or would be postponed. This is analyzed in the Final EIS for the 5-Year Program.

Alternatives for Proposed Western Planning Area Sales 210, 215, and 218

Alternative A—The Proposed Actions: This alternative would offer for lease all unleased blocks within the WPA for oil and gas operations (**Figure 2-1**), except the following:

(1) whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary; and

(2) for Sales 210 and 215 only, whole and partial blocks that lie within the 1.4-nmi buffer zone north of the continental shelf boundary between the U.S. and Mexico.

The WPA encompasses about 28.7 million ac. Approximately 18.3 million ac (64%) of the WPA sale area is currently unleased. The estimated amount of resources projected to be developed as a result of any one proposed WPA lease sale is 0.242-0.423 BBO and 1.644-2.647 Tcf of gas.

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

Alternative C—No Action: This alternative is the cancellation of one or more proposed WPA lease sales. The opportunity for development of the estimated 0.242-0.423 BBO and 1.644-2.647 Tcf of gas that could have resulted from a proposed WPA lease sale would be precluded or postponed. Any potential environmental impacts resulting from a proposed lease sale would not occur or would be postponed. This is analyzed in the Final EIS for the 5-Year Program.

Mitigating Measures

All of the proposed actions include existing regulations and proposed lease stipulations designed to reduce environmental risks, potential multiple-use conflicts between OCS operations and U.S. Department of Defense activities, and visual impacts from development operations south of Baldwin County, Alabama. Seven lease stipulations are proposed for the CPA sales—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; and the Protected Species Stipulation. The MMS has proposed no new mitigations to the CPA lease sales due to the addition of the 181 South Area. Four lease stipulations are proposed for the WPA sales—the Topographic Features Stipulation, the Military Areas Stipulation, the Operations in the Naval Mine Warfare Area Stipulation, and the Protected Species Stipulation.

Application of lease stipulations will be considered by the Assistant Secretary of the Interior for Land and Minerals (ASLM). The analysis of the stipulations as part of the proposed actions does not ensure that the ASLM will make a decision to apply the stipulations to leases that may result from any proposed lease sale, nor does it preclude minor modifications in wording during subsequent steps in the prelease process if comments indicate changes are necessary or if conditions warrant. Any stipulations or mitigation requirements to be included in a lease sale will be described in the Final Notice of Sale for that lease 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 the proposed actions (**Chapter 3.1**) and for the OCS Program (**Chapter 3.3**). The MMS's Gulf of Mexico OCS Region developed these scenarios to provide a framework for detailed analyses of potential impacts of the proposed lease sales. 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 an assumed 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 4.1**) considers environmental and socioeconomic impacts that may result from the incremental impact of the lease sales when added to all past, present, and reasonably foreseeable future human 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. This includes projected activity from lease sales that have been held, including the most recent Lease Sale 206 (March 2008), 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 SEIS 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 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, tourism, aesthetic interference, cultural impacts, environmental justice, and consistency with State coastal zone management programs. Environmental resources and activities determined through the scoping process to warrant an environmental analysis are water and air quality, sensitive coastal environments (coastal barrier beaches and associated dunes, wetlands, and seagrass communities), sensitive offshore resources, marine mammals, sea turtles, beach mice, endangered and threatened fish, coastal and marine birds, fisheries, recreational fishing, recreational resources, archaeological resources, and socioeconomic conditions.

Other issues include impacts 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 several major hurricanes. Appendix A.3 of the Multisale EIS provides detailed information on Hurricanes Lili (2002), Ivan (2004), Katrina (2005), and Rita (2005), which are discussed in **Chapter 4**. The description of the affected environment (**Chapter 4.1**) 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 (**Chapter 4.1)**.

Impact Conclusions

The MMS has reexamined the analysis presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusions as presented in the Multisale EIS. In some cases, new information that supported these conclusions was found.

Although the size of the proposed CPA sale area was increased due to the addition of the 181 South Area, there would be a negligible increase in environmental and socioeconomic impacts of an individual CPA lease sale. This negligible increase in impacts is the result of a number of different factors. The 181 South Area is located at the southeastern edge of the CPA sale area nearly 130 mi (209 km) from the nearest coast. A relatively minor amount of additional sale-related activity for the 181 South Area is projected because of the extreme water depths, the amount of interest in these water depths in recent lease sales, and the lack of recent seismic data. Drilling rig availability is still a limiting factor for exploration and development activity in the Gulf, and the 181 South Area would encounter the same rig availability issues as the rest of the Gulf. The minor increases in OCS activities in the 181 South Area could be handled adequately by existing personnel and infrastructure. Increases in indirect and secondary impacts of an individual CPA lease sale are also expected to be negligible. Therefore, the addition of the 181 South Area is expected to have minimal, if any, impacts on environmental and socioeconomic resources.

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

Air Quality: Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, routine activities occurring in the area are expected to have minimal impact on onshore air quality. In addition, no additional large spills or blowouts are projected as a result of the addition of the 181 South Area.

Emissions of pollutants into the atmosphere from the routine activities associated with the proposed actions in the CPA or WPA 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 (NAAQS). 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 hydrogen sulfide (H_2S) could result in deaths as well as environmental damage. These emissions from routine activities and accidental events associated with a proposed action are not expected to have concentrations that would change onshore air quality classifications.

Coastal and Marine Waters: The 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity; therefore, no additional impacts on coastal water quality are projected as a result of the inclusion of the 181 South Area.

Impacts from routine activities associated with a CPA or WPA proposed action 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. Marine 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 cause 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 m (328 ft) adjacent to the point of discharge. Structure installation and removal and pipeline placement disturbs the sediments and causes increased turbidity. In addition, marine water impacts result from supply and service-vessel bilge and ballast water discharges.

Smaller spills (<1,000 bbl) are not expected to significantly impact water quality in coastal or marine waters. Larger spills, however, could impact water quality in coastal waters. Accidental chemical spills, release of synthetic-based fluid (SBF), and blowouts would have temporary localized impacts on water quality.

Coastal Barrier Beaches and Associated Dunes: Due to both the distance from the proposed offshore activity (approximately 130 mi; 209 km) and the prevailing easterly winds, activities associated with the 181 South Area are expected to have little to no effect on barrier islands.

Routine activities in the CPA and WPA such as increased vessel traffic, maintenance dredging of navigation canals, and pipeline installation will cause negligible impacts and will 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 either a CPA or WPA proposed action are anticipated to be minimal.

Wetlands: Since the181 South Area is located nearly 130 mi (209 km) from the nearest coast, the area has little potential for direct impact to coastal wetlands as a result of the proposed activities in that area.

Routine activities in the CPA and WPA such as pipeline emplacement, navigational channel use, maintenance dredging, disposal of OCS wastes, and construction and maintenance of OCS support infrastructure in coastal areas are expected to result in low 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, are anticipated to be minimal.

Seagrass Communities: The 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity; therefore, no significant additional impacts on seagrass communities are projected as a result of the inclusion of the 181 South Area.

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

Live Bottoms (Pinnacle Trend): The 181 South Area is located 127 mi (204 km) from the Pinnacle Trend region and the pinnacle habitat is in water depths of (200-400 ft or; 60-120 m); therefore, activity associated with the 181 South Area would not impact live bottoms.

The combination of its depth (200-400 ft; 60-120 m), separation from sources of impacts as mandated by the Live Bottoms (Pinnacle Trend) Stipulation, and a community adapted to sedimentation makes damage to the ecosystem unlikely from routine activities associated with a CPA proposed action. In the unlikely event that oil from a subsurface spill would reach the biota of Pinnacle Trend communities, the effects would be primarily sublethal for adult sessile biota and there would be limited incidences of mortality.

No impacts are expected from a WPA proposed action because the Pinnacle Trend is over 300 mi (480 km) away; therefore, a WPA proposed action is not analyzed.

Topographic Features: Since the 181 South Area is 129 mi (207 km) from the nearest topographic feature, transiting service vessels would be the only likely impact from the 181 South Area on topographic features. Since the closest topographic feature habitats are deep, ≥184 ft (56 m) to their tops, it is unlikely that the 181 South Area would result in any effect unless a transiting vessel has a catastrophic accident near a bank.

The routine activities associated with a CPA or WPA proposed action 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 Feature 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 would keep subsurface sources of spills away from the immediate vicinity of topographic features.

Chemosynthetic and Nonchemosynthetic Deepwater Benthic Communities: The 181 South Area is not expected to have any chemosynthetic or hard-bottom nonchemosynthetic communities (such as deepwater corals) that would be exposed to any kind of impacts from routine activities or accidental events associated with a proposed action. There are no known surface amplitude anomalies in the 181 South Area, and this deep area is not underlain by salt structures that create conditions conducive to faulting and hydrocarbon flows similar to other areas of the Gulf.

Chemosynthetic and nonchemosynthetic communities are susceptible to physical impacts from structure placement, anchoring, and pipeline installation associated with a proposed action; however, the provisions of Notice to Lessees and Operators (NTL) 2000-G20 greatly reduce the risk of these physical impacts by requiring 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 from 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 a proposed action are expected to cause little damage to the ecological function or biological productivity of the widespread, low-density chemosynthetic communities and the widespread, typical, deep-sea benthic communities.

Marine Mammals: With the exception of manatees, any of the marine species that occur in the Gulf of Mexico may be found in the 181 South Area. However, the 181 South Area is not unique in regards to marine mammal distribution. Impacts from routine activities and accidental events occurring in the 181 South Area are similar to the rest of the sale area, and are not expected to have long-term adverse effects.

Routine events related to a CPA or WPA proposed action, particularly when mitigated as required by MMS, are not expected to have long-term adverse effects on the size and productivity of any marine mammal species or population endemic to the northern Gulf of Mexico. Characteristics of impacts from accidental events depend on chronic or acute exposure resulting in harassment, harm, or mortality to marine mammals, while exposure to dispersed hydrocarbons is likely to result in sublethal impacts.

Sea Turtles: Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, all five species of sea turtles may potentially exist within the 181 South Area. Impacts from routine activities and accidental events occurring in the 181 South Area are similar to the rest of the sale area. In most foreseeable cases, exposure to hydrocarbons persisting in the sea following the dispersal of an oil slick will result in sublethal impacts (e.g., decreased health, reproductive fitness, and longevity; and increased vulnerability to disease) to sea turtles.

The routine activities of a proposed action are unlikely to have significant adverse effects on the size and recovery of any sea turtle species or population in the Gulf of Mexico. Accidental events associated with a proposed action have the potential to impact small to large numbers of sea turtles. Populations of sea turtles in the northern Gulf of Mexico would be exposed to residuals of oils spilled as a result of a 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 most foreseeable cases, exposure to hydrocarbons persisting in the sea following the dispersal of an oil slick will result in sublethal impacts.

Alabama, Choctawhatchee, St. Andrew, and Perdido Key Beach Mice: Due to the extended distance from shore, impacts associated with activities occurring in the 181 South Area are not expected to impact beach mice.

An impact from the consumption of beach trash and debris associated with a 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 a 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 not properly regulated, oil-spill response and cleanup activities could have a significant impact to the beach mice and their habitat.

Because beach mice are located such a far distance from the proposed WPA sale area, the impacts of a WPA proposed action have not been analyzed.

Coastal and Marine Birds: Use of the 181 South Area by breeding or nonbreeding seabirds is unknown; however, the 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity; therefore, no additional impacts on coastal and marine birds are projected as a result of the inclusion of the 181 South Area. Disturbance to seabirds in the 181 South Area would be similar to disturbance to the birds in the other offshore waters of the proposed lease sale areas. Endangered or threatened bird species (i.e., piping plover, whooping crane, and brown pelican) that inhabit or frequent the north-central and western Gulf of Mexico coastal areas are not expected to occur in the 181 South Area.

The majority of effects resulting from routine activities associated with a CPA or WPA proposed action on endangered/threatened and nonendangered/nonthreatened coastal and marine birds are expected to be sublethal. These effects include behavioral effects, exposure to or intake of OCS-related contaminants or discarded debris, temporary disturbances, and displacement of localized groups from impacted habitats. Impacts from potential oil spills associated with a proposed action and oil-spill cleanup on birds are expected to be negligible; however, small amounts of oil can affect birds, and there are possible delayed impacts on their food supply.

Gulf Sturgeon: The 181 South Area is nearly 130 mi (209 km) from the nearest coast and is not located within the designated critical habitat for Gulf sturgeon. It is extremely unlikely that there will be any sturgeon in the 181 South Area due to water depths that far exceed the recorded depths preferred by this sturgeon species. In addition, the substrate type and potential forage base associated with bottom types at these depths are not conducive for sustaining a Gulf sturgeon food base.

Routine activities in the CPA such as installation of pipelines, maintenance dredging, potential vessel strikes, and nonpoint-source runoff from onshore facilities will cause negligible impacts and will not deleteriously affect Gulf sturgeon. Indirect impacts from routine activities to inshore habitats are negligible and indistinguishable from direct impacts of inshore activities. The potential impacts from accidental events, mainly oil spills associated with a CPA proposed action, are anticipated to be minimal. Because of the floating nature of oil 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 Gulf sturgeon has been infrequently noted in some of the extreme easternmost portions of the WPA, but there has been no critical habitat designated west of the Mississippi River. Because of the infrequency of occurrence of Gulf sturgeon in the WPA, the analysis of impacts to Gulf sturgeon is limited to the CPA.

Fish Resources and Essential Fish Habitat: The 181 South Area is located in very deep water (>2,600 m; 8,530 ft) and limited activities in that area would not have any measurable additional impacts to fish resources or essential fish habitat (EFH) for highly migratory species (the only managed species group that far offshore).

Fish resources and EFH could be impacted by coastal environmental degradation, marine environmental degradation, pipeline trenching, and offshore discharges of drilling discharges and produced waters associated with routine activities. The impact of coastal and marine environmental degradation is expected to cause an undetectable decrease in fish resources or in EFH. Impacts of routine discharges are localized in time and space and are regulated by USEPA permits and will have minimal impact. Accidental events that could impact fish resources and EFH include blowouts and oil or chemical spills. A subsurface blowout would have a negligible effect on Gulf of Mexico fish resources. If spills due to a proposed action were to occur in open waters of the OCS proximate to mobile adult finfish or shellfish, the effects would likely be nonfatal, and the extent of damage would be reduced due to the capability of adult fish and shellfish to avoid a spill.

Commercial Fishing: The 181 South Area is located nearly 130 mi (209 km) from the nearest coastline. There are no special regulations designated within this area that would indicate any difference in the commercial fisheries than what is found in adjacent areas of the Gulf.

Routine activities in the CPA and WPA such as seismic surveys and pipeline trenching will cause negligible impacts and will 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, a well blowout or an oil spill, associated with either a CPA or WPA proposed action are anticipated to be minimal. Commercial fishermen are anticipated to avoid the area of a well blowout or an oil spill. Any impact on catch or value of catch would be insignificant compared with natural variability.

Recreational Fishing: The inclusion of 181 South Area will have no direct routine impacts on recreational fishing due to its distance (nearly 130 mi; 209 km) from the nearest shore. Indirect impacts resulting from an incremental increase of vessel trips from activities in the 181 South Area is expected to be negligible.

Routine activities in the CPA and WPA such as seismic surveys and pipeline trenching will cause negligible impacts and will not deleteriously affect recreational fishing activities. Indirect impacts to inshore habitats are negligible and indistinguishable from direct impacts of inshore activities on commercial recreational fisheries. Temporary localized impacts from oil spills are anticipated as a result of a CPA or WPA proposed action, which would include temporary inconvenience to recreational fishermen and possibly some loss of revenue to facilities supported by recreational fishermen such as boat launches and bait shops.

Recreational Resources: The 181 South Area is located nearly 130 mi (209 km) from the nearest coast, far distant from recreational beaches, out of sight from land, and out of range for most recreational fishing. The inclusion of the 181 South Area is projected to result in a relatively minor amount of additional activity, limiting potential impacts from traffic and from trash and debris. The location of the

181 South Area and the limited activities that are expected to result also limit the potential impacts from oil spills. Therefore, no additional impacts on recreational resources are projected as a result of the inclusion of the 181 South Area.

While marine debris and nearshore operations, either individually or collectively, may adversely affect the quality of some recreational experiences, they are unlikely to reduce the number of recreational visits to Gulf coastal beaches. It is unlikely that a spill would be a major threat to recreational beaches because any impacts would be short term and localized, and should have no long-term effect on tourism.

Historic and Prehistoric Archaeological Resources: Given the extreme water depths in the 181 South Area, no prehistoric archaeological resources would likely be encountered in this area. Areas considered by MMS to have a high probability for historic period shipwrecks are located throughout the Gulf of Mexico, including the 181 South Area.

The greatest potential impact to an archaeological resource as a result of routine activities associated with a CPA or 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 or historic site. The archaeological survey and archaeological clearance of sites 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 damage to or loss of significant and/or unique archaeological information. It is expected that coastal archaeological resources will 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 a 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 would be temporary and reversible.

Land Use and Coastal Infrastructure: Although the addition of the 181 South Area resulted in some increases in the activity scenario for a typical CPA proposed action, these minor increases in activity were not significant enough to affect the long-term (i.e., 40-year) forecasts of coastal infrastructure needs to support either a typical CPA sale or the OCS Program.

A proposed action in the CPA (i.e., including the 181 South Area) or the WPA 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 a 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 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity; therefore, no additional impacts on employment, or the resulting population and demographics, are projected as a result of the inclusion of the 181 South Area.

A proposed action in the CPA (including the 181 South Area) or the WPA is projected to minimally affect the demography of the analysis area. Population impacts from a proposed action are projected to be minimal (<1% of total population) for any economic impact area (EIA) in the Gulf of Mexico region. The baseline population patterns and distributions, as projected and described in Chapter 3.3.5.4 of the Multisale EIS, are expected to remain unchanged as a result of a 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 (some of whom may be foreign) projected to move into focal areas, such as Port Fourchon. Accidental events associated with a proposed action such as oil or chemical spills, blowouts, and vessel collisions would have likely no effects on the demographic characteristics of the Gulf coastal communities.

Economic Factors: New economic and demographic data (Woods & Poole Economics, Inc., 2007) analyzed and the addition of the 181 South Area does not change the conclusions in the Multisale EIS, which stated that there would be only minor economic changes in the Texas, Louisiana, Mississippi, Alabama, and Florida EIA's should a proposed CPA or WPA lease sale occur.

A CPA or WPA proposed action is expected to generate less than 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 a proposed action is expected to occur in Texas and Louisiana. The demand would be met primarily with the existing population and labor force.

Environmental Justice: The 181 South Area is located at the eastern edge of the CPA sale area nearly 130 mi (209 km) from the nearest coast. Also, the 181 South Area is projected to result in a relatively minor amount of additional sale-related activity. This limited activity will have few impacts; the location of the 181 South Area means that any impacts that may result are unlikely to be concentrated in an area that could disproportionately impact minority or low income people. Therefore, no additional impacts on minority or low-income people are projected as a result of the inclusion of the 181 South Area.

Because the proposed CPA sale area lies 3 or more miles (4.8 or more kilometers) offshore, no activities that occur on the resulting leases (and that are regulated by MMS) will impact directly 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 proposed actions are not expected to have disproportionately high or adverse environmental or health effects on minority or low-income people. The CPA and WPA proposed actions would help to maintain ongoing levels of activity rather than expand them.

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CHAPTER 1

THE PROPOSED ACTIONS

1. THE PROPOSED ACTIONS

1.1. PURPOSE OF AND NEED FOR THE PROPOSED ACTIONS

Under the *Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012* (5-Year Program; USDOI, MMS, 2007a), six annual areawide lease sales are scheduled for the Central Planning Area (CPA) and five annual areawide lease sales are scheduled for the Western Planning Area (WPA) of the Gulf of Mexico Outer Continental Shelf (OCS). Those 11 CPA and WPA sales were analyzed in the *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* and are hereby incorporated by reference as the Multisale EIS (USDOI, MMS, 2007b). As of the publication of this draft supplemental environmental impact statement (SEIS), three of these sales have been held: WPA Sale 204 (August 2007), CPA Sale 205 (October 2007), and CPA Sale 206 (March 2008). Environmental assessments were prepared for CPA Sale 206 (USDOI, MMS, 2007c) and WPA Sale 207 (USDOI, MMS, 2008a).

The Gulf of Mexico Energy Security Act (GOMESA) of 2006 (P.L. 109-432, December 20, 2006) repeals the Congressional moratorium on certain areas of the Gulf of Mexico, places a moratorium on other areas in the Gulf of Mexico, and increases the distribution of offshore oil and gas revenues to coastal States.

The GOMESA defines two areas in the Gulf of Mexico—the 181 Area and the 181 South Area. Approximately 2 million acres (ac) of the 181 Area are located in the CPA. Because this portion was not previously under moratorium, it was included in the CPA proposed actions analyzed in the Multisale EIS and was available for lease starting with CPA Lease Sale 205 held on October 3, 2007. The remaining portion of the 181 Area is approximately 500,000 ac located in the Eastern Planning Area (EPA). The MMS published a Final SEIS in October 2007 on this eastern portion of the 181 Area, and it was offered in Lease Sale 224 on March 19, 2008.

One of the areas the GOMESA defines is referred to as the 181 South Area (Figure 1-1). This area is located in the CPA and is approximately 5.8 million acres (ac). The Minerals Management Service (MMS) is proposing the sale area for proposed CPA Sales 208 (2009), 213 (2010), 216 (2011), and 222 (2012) be expanded to include 4.3 million ac of the 181 South Area. The remaining acreage of the 181 South Area (1.5 million ac) is located beyond the U.S. Exclusive Economic Zone (EEZ) and, therefore, would not be offered. While GOMESA repealed the Congressional moratorium on the 181 South Area in December 2006, MMS decided, because of the limited geological and geophysical data available to industry and the limited environmental review for this area, it would be premature to offer this area prior to CPA Sale 208 (2009). The Multisale EIS did not analyze the 181 South Area. Therefore, MMS has prepared this separate National Environmental Policy Act (NEPA) review to reevaluate the expanded CPA sale area.

This supplemental environmental impact statement (SEIS) supplements the Multisale EIS. Not only does this SEIS analyze the potential environmental effects of oil and natural gas leasing, exploration, development, and production in the 181 South Area for the proposed CPA sales, but it also analyzes any new information available for the CPA and WPA (Sale 210 in 2009, Sale 215 in 2010, and Sale 218 in 2011) since the publication of the Multisale EIS.

The purpose of these proposed Federal actions is to offer for lease those areas that may contain economically recoverable oil and gas resources. 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 SEIS analyzes the potential impacts of the proposed actions on the marine, coastal, and human environments. No other NEPA documents will be prepared for proposed Lease Sale 208 in the CPA and proposed Lease Sale 210 in the WPA. An additional NEPA review will be conducted for each subsequent proposed lease sale in the 5-Year Program. Informal and formal consultations with other Federal agencies, the affected States, and the public will be carried out to assist in the determination of whether or not the information and analyses in this original SEIS are still valid and if there is sufficient NEPA review. These consultations and NEPA reviews will be completed before decisions are made on the subsequent sales.

The Outer Continental Shelf Lands Act (OCSLA) of 1953 (67 Stat. 462), as amended (43 U.S.C. 1331 *et seq*. (2008)), established Federal jurisdiction over submerged lands on the OCS seaward of the State boundaries. Under the OCSLA, the Department of the Interior (DOI) is required to manage the leasing, exploration, development, and production of oil and gas resources on the Federal OCS. The Secretary of the Interior (Secretary) oversees the OCS oil and gas program and is required to balance orderly resource development with protection of the human, marine, and coastal environments while simultaneously ensuring that the public receives an equitable return for these resources and that free-market competition is maintained. The Act empowers the Secretary to grant leases to the highest qualified responsible bidder(s) on the basis of sealed competitive bids and to formulate such regulations as necessary to carry out the provisions of the Act. The Secretary has designated MMS as the administrative agency responsible for the mineral leasing of submerged OCS lands and for the supervision of offshore operations after lease issuance.

The CPA and WPA 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 from the Gulf of Mexico can help reduce the Nation's need for oil imports and reduce the environmental risks associated with oil tankering. Natural gas is generally considered to be an environmentally preferable alternative to oil, both in terms of the production and consumption.

1.2. DESCRIPTION OF THE PROPOSED ACTIONS

The proposed actions are the remaining seven oil and gas lease sales in the CPA and WPA as scheduled for 2009-2012 under the 5-Year Program. Federal regulations allow for several related or similar proposals to be analyzed in one EIS (40 CFR 1502.4). Since the proposed lease sales in each lease sale area and their projected activities are very similar, MMS decided to prepare a single SEIS for the seven remaining CPA and WPA lease sales in the 5-Year Program.

Proposed Central Planning Area Lease Sales 208, 213, 216, and 222

The proposed CPA lease sales are Sale 208 in 2009, Sale 213 in 2010, Sale 216 in 2011, and Sale 222 in 2012. The CPA sale area encompasses about 63 million ac of the CPA's 66.3 million ac and is located 3 nautical miles (nmi) offshore Louisiana, Mississippi, and Alabama and extends seaward to the limits of the U.S. OCS to 3,458 meters (m) (11,345 feet (ft)) (**Figure 1-1**). Each subsequent proposed CPA sale would offer for lease all unleased blocks in the CPA for oil and gas operations (**Figure 1-1**), with the following exceptions:

(1) blocks directly south of Florida and within 100 miles (mi) of the Florida coast (north of the easternmost portion of the CPA sale area as shown on **Figure 1-1**);

(2) blocks that are beyond the U.S. Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap; and

(3) for Sales 208 and 213 only, whole and partial blocks that lie within the 1.4-nmi buffer zone north of the continental shelf boundary between the U.S. and Mexico.

The estimated amount of resources projected to be developed as a result of any one proposed CPA lease sale is 0.807-1.336 billion barrels of oil (BBO) and 3.365-5.405 trillion cubic feet (Tcf) of gas. The subsequent, proposed CPA lease sales include proposed lease stipulations designed to reduce environmental risks and are discussed in **Chapter 2.3**.

Proposed Western Planning Area Lease Sales 210, 215, and 218

The proposed WPA lease sales are Sale 210 in 2009, Sale 215 in 2010, and Sale 218 in 2011. The WPA encompasses about 28.7 million ac located 3 leagues (10.4 mi) offshore Texas and extends seaward to the limits of the U.S. OCS in water depths up to 3,346 m (10,978 ft) (**Figure 1-1**). Each WPA proposed lease sale would offer for lease all unleased blocks in the WPA for oil and gas operations (**Figure 1-1**), with the following exceptions:

(1) whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary; and

(2) for Sales 210 and 215 only, whole and partial blocks that lie within the 1.4-nmi buffer zone north of the continental shelf boundary between the United States (U.S.) and Mexico.

The estimated amount of resources projected to be developed as a result of any one proposed WPA lease sale is 0.242-0.423 BBO and 1.644-2.647 Tcf of gas. The proposed WPA lease sales include proposed lease stipulations designed to reduce environmental risks and are discussed in **Chapter 2.4**.

1.3. Regulatory Framework

Federal laws mandate the OCS leasing program (i.e., Outer Continental Shelf Lands Act) and the environmental review process (i.e., National Environmental Policy Act). Several Federal regulations establish specific consultation and coordination processes with Federal, State, and local agencies (i.e., 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 Federal, State, and local laws and regulations. Chapter 1.3 of the Multisale EIS provided summaries of the major, applicable, Federal laws and regulations listed below:

- Outer Continental Shelf Lands Act
- National Environmental Policy Act
- Coastal Zone Management Act
- The Endangered Species Act
- The Magnuson Fishery Conservation and Management Act
  - Essential Fish Habitat
  - Essential Fish Habitat Consultation
- The Marine Mammal Protection Act
- The Clean Air Act
- The Clean Water Act
- Harmful Algal Bloom and Hypoxia Research and Control Act
- The Oil Pollution Act
- Comprehensive Environmental Response, Compensation, and Liability Act
- The Resource Conservation and Recovery Act
- Marine Plastic Pollution Research and Control Act
- National Fishing Enhancement Act
  - Fishermen's Contingency Fund
- Ports and Waterways Safety Act
- Marine and Estuarine Protection Acts
  - Marine Protection, Research, and Sanctuaries Act
  - National Estuarine Research Reserves
  - The National Estuary Program
- Executive Order 11990 (May 24, 1977): Protection of Wetlands
- Coastal Barrier Resources Act
- The National Historic Preservation Act
- Rivers and Harbors Act
- Executive Order 12898: Environmental Justice
- Occupational Safety and Health Act
- Energy Policy Act of 2005
- Gulf of Mexico Energy Security Act of 2006
- Marine Debris Research, Prevention, and Reduction Act

1.4. PRELEASE PROCESS

Scoping for this SEIS 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 lease sales. The scoping process officially commenced on September 10, 2007, with the publication of the Notice of Intent to Prepare an SEIS (NOI) and Scoping Meetings in the *Federal Register*. A 45-day comment period, which closed on October 25, 2007, was provided. 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 SEIS. Formal scoping meetings were held during October 2007 in Texas, Louisiana, and Alabama. All scoping comments received were considered in the preparation of the Draft SEIS. The comments (both verbal and written) have been summarized in **Chapter 5.4**, Development of the Draft SEIS.

On August 10, 2006, the Area Identification (Area ID) decision was made for the proposed CPA and WPA lease sales in the 5-Year Program. On January 22, 2008, the Area ID decision was modified by adding the 181 South Area. 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 SEIS analyzes the potential impacts of the proposed actions on the marine, coastal, and human environments.

The MMS sent copies of the Draft SEIS for review and comment to public and private agencies, interest groups, and local libraries. To initiate the public review and comment period on the Draft SEIS, MMS published a Notice of Availability (NOA) in the *Federal Register* on April 11, 2008. Additionally, public notices were mailed with the Draft SEIS and placed on the MMS Internet website (http://www.gomr.mms.gov). In accordance with 30 CFR 256.26, MMS held public hearings to solicit comments on the Draft SEIS. The hearings provided the Secretary with information from interested parties to help in the evaluation of potential effects of the proposed lease sales. Notices of the public hearings were included in the NOA, posted on the MMS Internet website, and published in the *Federal Register* and local newspapers.

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, MMS reviews each State's Coastal Zone Management Program (CZMP) and analyzes the potential impacts as outlined in this SEIS, new information, and applicable studies as they pertain to the enforceable policies of each CZMP. Based on the analyses, the MMS Director makes an assessment of consistency, which is then sent to each State with the Proposed Notice of Sale (PNOS). If a State disagrees with MMS's CD, the State is required to do the following under the Coastal Zone Management Act (CZMA): (1) indicate how the MMS presale proposal is inconsistent with their CZMP and suggest alternative measures to bring the MMS proposal into consistency with their CZMP 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 presale activities. Either MMS or the State may request mediation. Mediation is voluntary, and the Department of Commerce (DOC) 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 presale consistency process. Each Gulf State's CZMP is described in Appendix B of the Multisale EIS (USDOI, MMS, 2007a).

A PNOS will become available to the public 4-5 months prior to a proposed sale. A notice announcing the availability of the PNOS 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 Notice of Sale (FNOS), including lease sale configuration and terms and conditions.

If the decision by the Assistant Secretary of the Interior for Land and Minerals (ASLM), under authority delegated by the Secretary of the Interior, is to hold a proposed sale, a FNOS will be published in its entirety in the *Federal Register* at least 30 days prior to the sale date, as required by the OCSLA.

This SEIS will be the only NEPA review conducted for CPA Sale 208 and WPA Sale 210. A lease sale EA will be conducted for each of the subsequent proposed lease sales to address any relevant new information. Informal and formal consultations with other Federal agencies, the affected States, and the public will be carried out to assist in the determination of whether or not the information and analyses in this EIS are still valid. Specifically, Information Requests will be issued soliciting input on the subsequent proposed lease sales.

The EA will tier from this SEIS and will summarize and incorporate the material by reference. Because the EA will be prepared for a proposal that "is, or is closely similar to, one which normally requires the preparation of an EIS" (40 CFR 1501.4(e)(2)), the EA will be made available for public review for a minimum of 30 days prior to making a decision on the proposed lease sale. Consideration of the EA and any comments received in response to the Information Request will result in either a Finding of No New Significant Impact (FONNSI) or the determination that the preparation of an SEIS is warranted. If the EA results in a FONNSI, the EA and FONNSI will be sent to the Governors of the affected States. The availability of the EA and FONNSI will be announced in the *Federal Register*. The FONNSI will become part of the documentation prepared for the decision on the Notice of Sale.

In some cases, the EA may result in a finding that it is necessary to prepare an SEIS (40 CFR 1502.9). Some of the factors that could justify an SEIS are a significant change in resource estimates, legal challenge on the EA/FONNSI, significant new information, significant new environmental issue(s), new proposed alternative(s), a significant change in the proposed action, or the analysis in this EIS is no longer deemed adequate.

If an SEIS is necessary, it will also tier from this SEIS and will summarize and incorporate the material by reference. The analysis will focus on addressing the new issue(s) or concern(s) that prompted the decision to prepare the SEIS. The SEIS will include a discussion explaining the purpose of the SEIS, a description of the proposed action and alternatives, a comparison of the alternatives, a description of the affected environment for any potentially affected resources that are the focus of the SEIS and were not described in this EIS, an analysis of new impacts or changes in impacts from this SEIS because of new information or the new issue(s) analyzed in the SEIS, and a discussion of the consultation and coordination carried out for the new issues or information analyzed in the SEIS.

1.5. POSTLEASE ACTIVITIES

The MMS is 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 250, 30 CFR 251, and 30 CFR 254.

Measures to mitigate potential impacts are an integral part of the OCS Program. These measures are implemented through lease stipulations, operating regulations, Notices to Lessees and Operators (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, 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. A few examples of standard mitigation measures in the Gulf of Mexico OCS are

- limiting the size of explosive charges used for structure removals;
- requiring placement explosive charges at least 15 ft below the mudline;
- requiring site-clearance procedures to eliminate potential snags to commercial fishing nets;
- establishment of No Activity and Modified Activity Zones around high-relief live bottoms;
- requiring remote-sensing surveys to detect and avoid 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.

The MMS issues NTL's to provide clarification, description, or interpretation of a regulation; guidelines on the implementation of a special lease stipulation or regional requirement; or convey administrative information. A detailed listing of current Gulf of Mexico OCS Region NTL's is available through the MMS, Gulf of Mexico OCS Region's Internet website at http://www.gomr.mms.gov/homepg/regulate/regs/ntls/ntl_lst.html or through the Region's Public Information Office at (504) 736-2519 or 1-800-200-GULF.

Conditions of approval are mechanisms to control or mitigate potential safety or environmental problems associated with proposed operations. Conditions of approval are based on MMS 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 MMS-identified mitigation measures are implemented through cooperative agreements or efforts with the oil and gas industry and Federal and State agencies. These measures include the National Marine Fisheries Service (NMFS) Observer Program to protect marine mammals and sea turtles when OCS structures are removed using explosives, labeling of operational supplies to track sources of accidental debris loss, development of methods of pipeline landfall to eliminate impacts to barrier beaches, and semiannual beach cleanup events.

Chapter 1.5 of the Multisale EIS describes in detail these and other postlease activities, and associated regulations, review processes, and conditions of approval.

CHAPTER 2

ALTERNATIVES INCLUDING THE PROPOSED ACTIONS

2. ALTERNATIVES INCLUDING THE PROPOSED ACTIONS

This SEIS addresses four areawide oil and gas lease sales in the CPA and three areawide oil and gas lease sales in the WPA of the Gulf of Mexico OCS (**Figure 1-1**), as scheduled in the proposed *Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012* (5-Year Program, USDOI, MMS, 2007a). Each of the proposed lease sales in a sale area is expected to be within the scenario ranges for the sale area; therefore, a CPA proposed action is representative of proposed CPA Lease Sales 208, 213, 216, and 222, and a WPA proposed action is representative of proposed WPA Lease Sales 210, 215, and 218. Each proposed action (proposed lease sale) includes existing regulations and lease stipulations.

The MMS has proposed no new alternatives or mitigations to the proposed CPA lease sales due to the addition of the 181 South Area.

2.1. ALTERNATIVES, MITIGATING MEASURES, AND ISSUES

2.1.1. Alternatives

2.1.1.1. Alternatives for Proposed Central Planning Area Sales 208, 213, 216, and 222

The following four alternatives were included for analysis in the Multisale EIS, and are described in detail in **Chapter 2.2**. As explained in **Chapter 2.1.3.2**, the Use of a Nomination and Tract Selection Leasing System Alternative was not included for analysis in this SEIS due to an ongoing MMS study on alternative approaches to leasing. No new alternatives were proposed due to the addition of the 181 South Area to the proposed CPA lease sales.

Alternative A—The Proposed Actions: This alternative would offer for lease all unleased blocks within the CPA for oil and gas operations (**Figure 2-1**), except the following:

(1) blocks that were previously included within the Eastern Planning Area (EPA) and that are within 100 mi of the Florida coast;

(2) blocks that are beyond the U.S. Exclusive Economic Zone (EEZ) in the area known as the northern portion of the Eastern Gap; and

(3) for Sales 208 and 213 only, whole and partial blocks that lie within the 1.4-nmi buffer zone north of the continental shelf boundary between the U.S. and Mexico.

The CPA sale area encompasses about 63 million ac of the CPA's 66.3 million ac. Approximately 37.1 million ac (59%) of the CPA sale area is currently unleased. The estimated amount of resources projected to be developed as a result of any one proposed CPA lease sale is 0.807-1.336 BBO and 3.365-5.405 Tcf of gas.

Alternative B—The Proposed Actions Excluding the Unleased Blocks Near Biologically Sensitive Topographic Features: This alternative would offer for lease all unleased blocks in the CPA, as described for the proposed actions (Alternative A), with the exception of any unleased blocks subject to the Topographic Features Stipulation. No topographic features are located in the 181 South Area; therefore, no blocks located in the 181 South Area would be excluded under Alternative B.

Alternative C—The Proposed Actions Excluding the Unleased Blocks within 15 Miles of the Baldwin County, Alabama, Coast: This alternative would offer for lease all unleased blocks in the CPA, as described for the proposed actions (Alternative A), with the exception of any unleased blocks within 15 mi (24 km) of the Baldwin County, Alabama, coast. The 181 South Area is located more than 90 mi (145 km) south of the Baldwin County, Alabama; therefore, no blocks located in the 181 South Area would be excluded under Alternative C.

Alternative D—No Action: This alternative is the cancellation of one or more proposed CPA lease sales, including leases that would be offered in the 181 South Area. The opportunity for development of the estimated 0.807-1.336 BBO and 3.365-5.405 Tcf of gas that could have resulted from a proposed CPA lease sale would be precluded or postponed. Any potential environmental impacts resulting from a proposed lease sale would not occur or would be postponed. This is analyzed in the Final EIS for the 5-Year Program.

2.1.1.2. Alternatives for Proposed Western Planning Area Sales 210, 215, and 218

The following four alternatives were included for analysis in the Multisale EIS, and are described in detail in **Chapter 2.3**. As explained in **Chapter 2.1.3.2**, the Use of a Nomination and Tract Selection Leasing System Alternative was not included for analysis in this SEIS due to an ongoing MMS study on alternative approaches to leasing.

Alternative A—The Proposed Actions: This alternative would offer for lease all unleased blocks within the WPA for oil and gas operations (**Figure 2-1**), except the following:

(1) whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary; and

(2) for Sales 210 and 215 only, whole and partial blocks that lie within the 1.4-nmi buffer zone north of the continental shelf boundary between the U.S. and Mexico.

The WPA sale area encompasses about 28.7 million ac. Approximately 18.3 million ac (64%) of the WPA sale area is currently unleased. The estimated amount of resources projected to be developed as a result of any one proposed WPA lease sale is 0.242-0.423 BBO and 1.644-2.647 Tcf of gas.

Alternative B—The Proposed Actions 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 actions (Alternative A), with the exception of any unleased blocks subject to the Topographic Features Stipulation.

Alternative C—No Action: This is the cancellation of one or more proposed WPA lease sales. The opportunity for development of the estimated 0.242-0.423 BBO and 1.644-2.647 Tcf of gas that could have resulted from a proposed WPA lease sale would be precluded or postponed. Any potential environmental impacts resulting from a proposed lease sale would not occur or would be postponed. This is analyzed in the Final EIS for the 5-Year Program.

2.1.2. Mitigating Measures

In 1978, Section 1508.20 of the Council on Environmental Quality (CEQ) defined mitigation as:

- Avoidance—The avoidance of an impact altogether by not taking a certain action or part of an action.
- Minimization—The minimizing of impacts by limiting the degree or magnitude of the action and its implementation.
- Restoration—The rectifying of the impact by repairing, rehabilitation, or restoring the affected environment.
- Maintenance—The reducing or eliminating of the impact over time by preservation and maintenance operations during the life of the action.
- Compensation—The compensation for the impact by replacing or providing substitute resources or environments.

2.1.2.1. Proposed Mitigating Measures Analyzed

The potential mitigating measures included for analysis in this SEIS were developed as the result of scoping efforts over a number of years for the continuing OCS Program in the Gulf of Mexico. Seven lease stipulations are proposed for all the CPA sales—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, and the Protected Species Stipulation. Four lease stipulations are proposed for the WPA sales—the Topographic Features

Stipulation, the Military Areas Stipulation, the Operations in the Naval Mine and Anti-Submarine Warfare Area Stipulation, and the Protected Species 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 as part of Alternative A does not ensure that the ASLM will make a decision to apply the stipulations to leases that may result from any proposed lease sale nor does it preclude minor modifications in wording during subsequent steps in the prelease process if comments indicate changes are necessary or if conditions change.

Any stipulations or mitigation requirements to be included in a lease sale will be described for that lease sale. Mitigation 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 may result from a lease sale, will undergo a NEPA review, and additional project-specific mitigations may be applied as conditions of plan approval. The MMS 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 the conditions of permit approvals, including stipulations and other mitigating measures.

2.1.2.2. Existing Mitigating Measures

This section discusses only mitigation measures that would be applied by MMS. Mitigating measures have been proposed, identified, evaluated, or developed through previous MMS 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 MMS review and approval to ensure compliance with established laws and regulations. Existing mitigating measures must be incorporated and documented in plans submitted to MMS. Operational compliance of these mitigating measures is enforced through the MMS on-site inspection program.

Mitigating measures that are a standard part of the MMS program ensure that the operations are always conducted in an environmentally sound manner (with a zero tolerance of pollution and with every regulatory effort to minimize any adverse impact of routine operations to the environment). For example, mitigating measures ensure site clearance procedures eliminate potential snags to commercial fishing nets and require surveys to detect and avoid archaeological sites and biologically-sensitive areas such as pinnacles, topographic features, and chemosynthetic communities.

Some MMS-identified mitigating measures are incorporated into OCS operations through cooperative agreements or efforts with industry and various State and Federal agencies. These mitigating measures include NMFS Service's Observer Program to protect marine mammals and sea turtles during explosive removals, labeling operational supplies to track possible sources of accidental debris loss, development of methods of pipeline landfall to eliminate impacts to barrier beaches, and semiannual beach cleanup events.

Site-specific mitigating measures are also applied by MMS during plan and permit reviews. The MMS 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 MMS 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 (EWTA's), naval mine warfare 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, reminders, and safety precautions. In addition to standard mitigations, MMS may also apply nonrecurring mitigating measures that are developed on a case-by-case basis.

The MMS is continually revising applicable mitigations to allow the Gulf of Mexico 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 after a triggering event that is currently tracked by MMS (e.g., end of operations reports for plans, construction reports for pipelines, and removal reports for structure removals).

2.1.3. 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 present conditions for each issue due to the relevant actions related to the proposed actions.

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

- issue is identified in CEQ regulations as subject to evaluation;
- the relevant resource/activity was identified 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 (IPF) associated with the OCS Program; a reasonable probability of an interaction between the resource/activity and IPF should exist; or
- information that indicates a need to evaluate the potential impacts to a resource/activity has become available.

2.1.3.1. Issues to be Analyzed

Like the Multisale EIS, this SEIS addresses issues related to potential impact-producing factors, and the environmental and economic resources and activities that could be affected by OCS exploration, development, production, and transportation activities. In addition, this SEIS addresses the potential environmental and socioeconomic effects of oil and natural gas leasing, exploration, development, and production in the 181 South Area, and any new information available for the remainder of the proposed sale areas since the publication of the Multisale EIS.

2.1.3.2. Issues Considered but Not Analyzed

As previously noted, the Council on Environmental Quality's (CEQ's) 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.

Through our scoping efforts, numerous issues and topics were identified for consideration in the Multisale EIS and for this SEIS. After careful evaluation and study, the following categories were considered not to be significant issues related to the proposed actions or that have been covered by prior environmental review.

Program and Policy Issues

Comments and concerns that relate to program and policy are issues under the direction of the Department of the Interior and/or MMS, and their guiding regulations, statutes, and laws. The comments and concerns related to program and policy issues are not considered to be specifically related to the proposed actions and are forwarded to the appropriate program offices for their consideration. Programmatic issues including expansion of the sale areas, administrative boundaries, and royalty relief have been considered in the preparation of the EIS for the 5-Year Program.

Revenue Sharing

A number of comments were received from State and local governments, interest groups, and the general public stating that locally affected communities should receive an increased share of revenues generated by the OCS oil and gas leasing program. This increased revenue would act as mitigation of OCS-related impacts to coastal communities including impacts to LA Hwy 1 and Lafourche Parish, Louisiana, from OCS-related activity at Port Fourchon. Comments and concerns that relate to the use and distribution of revenues are issues under the direction of the Congress of the U.S. or the Department of the Interior, and their guiding regulations, statutes, and laws.

The MMS distributes revenues collected from Federal mineral leases to special-purpose funds administered by Federal agencies; to States; and to the General Fund of the U.S. Department of the Treasury. Legislation and regulations provide formulas for the disbursement of these revenues. The distribution of revenues is discussed in Chapter 3.3.5.2 of the Multisale EIS.

With the enactment of the Gulf of Mexico Energy Security Act of 2006 (GOMESA), the Gulf producing States (i.e., Texas, Louisiana, Mississippi, and Alabama) and their coastal political subdivisions (CPS's) will receive an increased share of offshore oil and gas revenue. Beginning in FY 2007, and thereafter, Gulf producing States and their CPS's will receive 37.5 percent of the qualified OCS revenue from new leases issued in the 181 Area in the EPA and the 181 South Area. Beginning in FY 2016, and thereafter, Gulf producing States and their CPS's will receive 37.5 percent and the Land and Water Conservation Fund will receive 12.5 percent of qualified OCS revenue from new leases in the existing areas available for leasing, subject to a $500 million cap. The remaining 50 percent of qualified OCS revenues and revenues exceeding the $500 million cap will be distributed to the U.S. Treasury.

The socioeconomic benefits and impacts to local communities are analyzed in **Chapter 4** of this SEIS.

Alternatives to Areawide Leasing

The Multisale EIS analyzed the Use of a Nomination and Tract Selection Leasing System Alternative for both a CPA and WPA proposed action. Since the publication of the Multisale EIS, MMS has contracted a study of leasing policy alternatives that may serve to further the many goals of the OCSLA. Elements of alternative policies to be examined include the following: setting limited sale size by nomination or selection approaches; reducing the acreage offered in each sale; breaking up the CPA and WPA; altering the frequency of sales; raising royalty rates; and changing the auction bidding variable or payment scheme. As part of the study, specific criteria ("metrics") based on statutory goals of the 5-year Program will be developed, and these criteria will be used to examine alternatives using empirical analysis and modeling, laboratory experiments, and simulation. The analysis will also include the design of possible field tests. The study began in October 2007 and is expected to take about 18 months to complete. In addition, it is likely that MMS will spend another year on internal review, evaluation, and decisionmaking as the transition to a new administration is completed. If it is determined that some alternative approach to leasing policy is preferable, and depending on how long it takes to conduct and digest the analysis, the 5-Year Program for 2007-2012 could be adjusted accordingly, or the new approach could be subject to consideration through the public comment and review process leading to the subsequent 5-Year Program. The current 5-Year Program covers the period July 2007 to June 30, 2012. On August 1, 2008, MMS published a request for comments in the *Federal Register* on the preparation of a new 5-year OCS oil and gas leasing program. The MMS is soliciting information on whether to begin a new Program for mid-2010 to mid-2015 (approximate dates) to succeed the current one. The *Federal Register* notice, in particular, comments on areas that are restricted from leasing by Congressional moratoria but were removed from Presidential withdrawal on July 14, 2008.

The MMS must be cognizant of the effects any policy changes might have on the achievement of other statutory goals of the Federal OCS Program. Among these are expeditious and orderly development and maintaining a diverse and competitive industry. Areawide leasing allows smaller independent companies to rapidly produce low-resource, low-risk fields, while larger companies push technological development at a slower pace in deep water. Areawide leasing also encourages strong and innovative seismic exploration and geophysical contracting and processing industries. In addition, a sudden change in policy that restricts access to oil and gas resources or that alters the timetables the offshore industry has come to depend on may lead to undesirable socioeconomic disruptions in local coastal economies. The

MMS expects the forthcoming, detailed analysis of alternatives to areawide leasing to address such possible consequences. Therefore, pending completion of that analysis, MMS believes that it is not appropriate to include the Use of a Nomination and Tract Selection Leasing System Alternative in this SEIS.

2.2. Proposed Central Planning Area Lease Sales 208, 213, 216, and 222

The following four alternatives were included for analysis in the Multisale EIS. As explained in **Chapter 2.1.3.2**, the Use of a Nomination and Tract Selection Leasing System Alternative was not included for analysis in this SEIS due to an ongoing MMS study on alternative approaches to leasing. No new alternatives were proposed due to the addition of the 181 South Area to the proposed CPA lease sales.

2.2.1. Alternative A—The Proposed Actions

2.2.1.1. Description

Alternative A would offer for lease all unleased blocks within the CPA including the 181 South Area (4.3 million ac) for oil and gas operations (**Figure 1-1**), except the following:

(1) blocks that were previously included within the EPA and that are within 100 mi of the Florida coast;

(2) blocks that are beyond the U.S. Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap; and

(3) for Sales 208 and 213 only, whole and partial blocks that lie within the 1.4-nmi buffer zone north of the continental shelf boundary between the U.S. and Mexico.

The CPA sale area encompasses about 63 million ac of the CPA's 66.3 million ac. Approximately 37.1 million ac (59%) of the CPA sale area is currently unleased. The estimated amount of resources projected to be developed as a result of any one proposed CPA lease sale is 0.807-1.336 BBO and 3.365-5.405 Tcf of gas.

The analyses of impacts summarized below and described in detail in **Chapter 4.1** 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 **Chapters 3.1.1, 3.1.2, and 3.2**.

2.2.1.2. Summary of Impacts

Air Quality (Chapter 4.1.1)

The MMS has reexamined the analysis for air quality presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for air quality presented in the Multisale EIS. Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, routine activities occurring in the area are expected to have minimal impact on onshore air quality. In addition, no additional large spills or blowouts are projected as a result of the addition of the 181 South Area.

Emissions of pollutants into the atmosphere from the routine activities associated with the proposed action in the CPA 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 NAAQS. 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 a proposed action are not expected to have concentrations that would change onshore air quality classifications.

Water Quality

Coastal Waters (Chapter 4.1.2.1)

The MMS has reexamined the analysis for water quality presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for water quality presented in the Multisale EIS. The 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity; therefore, no additional impacts on water quality are projected as a result of the inclusion of the 181 South Area.

Impacts from routine activities associated with a proposed action 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. Structure installation and removal and pipeline placement disturb the sediments and cause increased turbidity.

Smaller spills (<1,000 barrels (bbl)) are not expected to significantly impact water quality in coastal waters. Larger spills, however, could impact water quality in coastal waters. Accidental chemical spills, release of SBF, and blowouts would have temporary localized impacts on water quality.

Marine Waters (Chapter 4.1.2.2)

The MMS has reexamined the analysis for water quality presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for marine water quality presented in the Multisale EIS. The 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity; therefore, no additional impacts on water quality are projected as a result of the inclusion of the 181 South Area.

Impacts from routine activities associated with a proposed action would be minimal if all existing regulatory requirements are met. Marine 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 cause 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 m (328 ft) adjacent to the point of discharge. Structure installation and removal and pipeline placement disturb the sediments and cause increased turbidity. In addition, marine water impacts result from supply and service-vessel bilge and ballast water discharges.

Smaller spills (<1,000 bbl) are not expected to significantly impact water quality in marine waters. Larger spills, however, could impact water quality in marine waters. Accidental chemical spills, release of SBF, and blowouts would have temporary localized impacts on water quality.

Sensitive Coastal Environments

Coastal Barrier Beaches and Associated Dunes (Chapter 4.1.3.1)

The MMS has reexamined the analysis for barrier islands and associated dunes presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for barrier islands and associated dunes presented in the Multisale EIS. Due to both the distance from the proposed offshore activity (approximately 130 mi (209 km)) and the prevailing easterly winds, activities associated with the 181 South Area are expected to have little to no affect on barrier islands.

Routine activities in the CPA such as increased vessel traffic, maintenance dredging of navigation canals, and pipeline installation will cause negligible impacts and will 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 a CPA proposed action are anticipated to be minimal.

Wetlands (Chapter 4.1.3.2)

The MMS has reexamined the analysis for wetlands presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for wetlands presented in the Multisale EIS. Since the 181 South Area is 130 mi (209 km) from the nearest coast, the area has little potential for direct impact to coastal wetlands as a result of the proposed activities in that area.

Effects to coastal wetlands from the primary impact-producing activities associated with a proposed action are expected to be low. The primary impact-producing activities associated with routine activities for the CPA proposed action that could affect wetlands include pipeline emplacement, construction, and maintenance; navigation channel use (vessel traffic) and maintenance; disposal of OCS-related wastes; and use and construction of support infrastructure in these coastal areas. Vessel traffic associated with a proposed action is expected to contribute minimally to the erosion and widening of navigation channels and canals. Deltaic Louisiana is expected to continue to experience the greatest loss of wetland habitat.

Routine activities in the CPA such as pipeline emplacement, navigational channel use, maintenance dredging, disposal of OCS wastes, and construction and maintenance of OCS support infrastructure in coastal areas are expected to result in low impacts. Indirect impacts from wake erosion and saltwater intrusion are expected to result in low impacts, which are indistinguishable from direct impacts from inshore activities. The potential impacts from accidental events, primarily oil spills, are anticipated to be minimal.

Seagrass Communities (Chapter 4.1.3.3)

The MMS has reexamined the analysis for seagrass communities presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for seagrass communities presented in the Multisale EIS. The 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity; therefore, no significant additional impacts on seagrass communities are projected as a result of the inclusion of the 181 South Area.

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

Sensitive Offshore Benthic Resources

Live Bottoms (Pinnacle Trend) (Chapter 4.1.4.1)

The MMS has reexamined the analysis for live bottoms (Pinnacle Trend) presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for live bottoms (Pinnacle Trend) presented in the Multisale EIS. The 181 South Area is located 127 mi (204 km) from the Pinnacle Trend region, and the pinnacle habitat is deep, 200-400 ft (60-120 m); therefore, activity associated with the 181 South Area would not impact live bottoms.

The combination of its depth (200-400 ft or 60-120 m), separation from sources of impacts as mandated by the Live Bottoms (Pinnacle Trend) Stipulation, and a community adapted to sedimentation makes damage to the ecosystem unlikely from routine activities associated with a CPA proposed action. In the unlikely event that oil from a subsurface spill would reach the biota of Pinnacle Trend communities, the effects would be primarily sublethal for adult sessile biota and there would be limited incidences of mortality.

Topographic Features (Chapter 4.1.4.2)

The MMS has reexamined the analysis for topographic features presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for topographic features presented in the Multisale EIS. New information was found that supports previous assessments and illustrates the potential effects of natural events, especially the cumulative impacts of hurricanes. Since the 181 South Area is 129 mi (207 km) from the nearest topographic feature, transiting service vessels would be the only likely impact from the 181 South Area on topographic features. Since the closest topographic feature habitats are deep, ≥183 ft (>56 m) to their tops, it is unlikely that the 181 South Area would result in any effect unless a transiting vessel has a catastrophic accident near a bank.

The routine activities associated with a CPA proposed action 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 Feature 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 Stipulations would keep subsurface sources of spills away from the immediate vicinity of topographic features.

Chemosynthetic and Nonchemosynthetic Deepwater Benthic Communities (Chapter 4.1.5)

The MMS has reexamined the analysis for continental slope and deepwater resources presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for continental slope and deepwater resources presented in the Multisale EIS. The 181 South Area is not expected to have any chemosynthetic or hard-bottom, nonchemosynthetic communities (such as deepwater corals) that would be exposed to any kind of impacts from routine activities or accidental events associated with a proposed action. There are no known surface amplitude anomalies in the 181 South Area, and this deep area is not underlain by salt structures that create conditions conducive to faulting and hydrocarbon flows similar to other areas of the Gulf.

Chemosynthetic and nonchemosynthetic communities are susceptible to physical impacts from structure placement, anchoring, and pipeline installation associated with a proposed action; however, the provisions of NTL 2000-G20 greatly reduce the risk of these physical impacts by requiring 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 from 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 a proposed action are expected to cause little damage to the ecological function or biological productivity of the widespread, low-density chemosynthetic communities and the widespread, typical, deep-sea benthic communities.

Marine Mammals (Chapter 4.1.6)

The MMS has reexamined the analysis of the 29 species of marine mammals occurring in the Gulf of Mexico presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for marine mammals presented in the Multisale EIS. With the exception of manatees, any of the marine species that occur in the Gulf of Mexico may be found in the 181 South Area. However, the 181 South Area is not unique in regards to marine mammal distribution. Impacts from routine activities and accidental events occurring in the 181 South Area are similar to the rest of the sale area, and the impacts are not expected to have long-term adverse effects.

Routine events related to a proposed action in the CPA, particularly when mitigated as required by MMS, are not expected to have long-term adverse effects on the size and productivity of any marine mammal species or population endemic to 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 (Chapter 4.1.7)

The MMS has reexamined the analysis for the five sea turtles species that inhabit the Gulf of Mexico presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. While information from the 5-year status reviews for federally listed sea turtles in the Gulf of Mexico was incorporated, there was no significant new information that would alter the impact conclusion for sea turtles presented in the Multisale EIS, and U.S. Fish and Wildlife Service (FWS) and NMFS recommended that the current listing classifications remain unchanged. Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, all five species of sea turtles may potentially exist within the 181 South Area. Impacts from routine activities and accidental events occurring in the 181 South Area are similar to the rest of the sale area. In most foreseeable cases, exposure to hydrocarbons persisting in the sea following the dispersal of an oil slick will result in sublethal impacts (e.g., decreased health, reproductive fitness, and longevity; and increased vulnerability to disease) to sea turtles.

The routine activities of a proposed action are unlikely to have significant adverse effects on the size and recovery of any sea turtle species or population in the Gulf of Mexico. Accidental events associated with a proposed action have the potential to impact small to large numbers of sea turtles. Populations of sea turtles in the northern Gulf of Mexico would be exposed to residuals of oils spilled as a result of a 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 most foreseeable cases, exposure to hydrocarbons persisting in the sea following the dispersal of an oil slick will result in sublethal impacts.

Alabama, Choctawhatchee, St. Andrew, and Perdido Key Beach Mice (Chapter 4.1.8)

The MMS has reexamined the analysis for beach mice presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for beach mice presented in the Multisale EIS. Due to the extended distance from shore, impacts associated with activities occurring in the 181 South Area are not expected to impact beach mice.

An impact from consumption of beach trash and debris associated with a proposed action in the CPA on the Alabama, Choctawhatchee, St. Andrew, and Perdido Key beach mice is possible but unlikely. While potential spills that could result from a 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 not properly regulated, oil-spill response and cleanup activities could have a significant impact to the beach mice and their habitat.

Coastal and Marine Birds (Chapter 4.1.9)

The MMS has reexamined the analysis for coastal and marine birds presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for coastal and marine birds presented in the Multisale EIS. Use of the 181 South Area by breeding or nonbreeding seabirds is unknown; however, the 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity. Therefore, no additional impacts on coastal and marine birds are projected as a result of the inclusion of the 181 South Area. Disturbance to seabirds in the 181 South Area would be similar to disturbance to the birds in the other offshore waters of the proposed lease sale areas. Endangered or threatened bird species (i.e., piping plover, whooping crane, and brown pelican) that inhabit or frequent the north-central and western Gulf of Mexico coastal areas are not expected to occur in the 181 South Area.

The majority of effects resulting from routine activities associated with a proposed action in the CPA on endangered/threatened and nonendangered/nonthreatened coastal and marine birds are expected to be sublethal. These activities include behavioral effects, exposure to or intake of OCS-related contaminants or discarded debris, temporary disturbances, and displacement of localized groups from impacted habitats. Impacts from potential oil spills associated with a proposed action and oil-spill cleanup on birds are expected to be negligible; however, small amounts of oil can affect birds, and there are possible delayed impacts on their food supply.

Endangered and Threatened Fish

Gulf Sturgeon (Chapter 4.1.10.1)

The MMS has reexamined the analysis for Gulf sturgeon presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for Gulf sturgeon presented in the Multisale EIS. The 181 South Area is nearly 130 mi (209 km) from the nearest coast, and it is not located within the designated critical habitat for Gulf sturgeon. It is extremely unlikely that there will be any sturgeon in the 181 South Area due to water depths that far exceed the recorded depths preferred by this sturgeon species. In addition, substrate type and potential forage base associated with bottom types at these depths are not conducive for sustaining a Gulf sturgeon food base.

Routine activities in the CPA such as installation of pipelines, maintenance dredging, potential vessel strikes, and nonpoint source runoff from onshore facilities will cause negligible impacts and will not deleteriously affect Gulf sturgeon. Indirect impacts from routine activities to inshore habitats are negligible and indistinguishable from direct impacts of inshore activities. The potential impacts from accidental events, mainly oil spills associated with a CPA proposed action, are anticipated to be minimal. Because of the floating nature of oil 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.

Fish Resources and Essential Fish Habitat (Chapter 4.1.11)

The MMS has reexamined the analysis for fisheries and EFH presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for fisheries and EFH presented in the Multisale EIS. Due to the extreme depths in this area, the only managed fish species (and their pelagic EFH) are some of the highly migratory species including sharks, billfish, and tuna. The 181 South Area is located in very deep water (> 2,600 m) and limited activities in that area would not have any measurable additional impacts to fish resources or EFH for highly migratory species (the only managed species group that far offshore).

Fish resources and EFH could be impacted by coastal environmental degradation, marine environmental degradation, pipeline trenching, and offshore discharges of drilling fluids and produced waters associated with routine activities. The impact of coastal and marine environmental degradation is expected to cause an undetectable decrease in fish resources or in EFH. Impacts of routine discharges are localized in time and space and are regulated by U.S. Environmental Protection Agency (USEPA) permits and will have minimal impact. Accidental events that could impact fish resources and EFH include blowouts and oil or chemical spills. A subsurface blowout would have a negligible effect on Gulf of Mexico fish resources. If spills due to a proposed action were to occur in open waters of the OCS proximate to mobile adult finfish or shellfish, the effects would likely be nonfatal and the extent of damage would be reduced due to the capability of adult fish and shellfish to avoid a spill.

Commercial Fishing (Chapter 4.1.12)

The MMS has reexamined the analysis for commercial fishing presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. New fishery statistics analyzed and the addition of the 181 South Area do not change the conclusion in the Multisale EIS that impacts on the commercial fisheries from the proposed action would be minimal.

Routine activities in the CPA such as seismic surveys and pipeline trenching will cause negligible impacts and will 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, a well blowout, or an oil spill associated with a CPA proposed action are anticipated to be minimal. Commercial fishermen are anticipated to avoid the area of a well blowout or an oil spill. Any impact on catch or value of catch would be insignificant compared to natural variability.

Recreational Fishing (Chapter 4.1.13)

The MMS has reexamined the analysis for recreational fishing presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. New information was not significantly different from that provided in the Multisale EIS; therefore, no information was found that would alter the conclusions in the Multisale EIS that impacts on the recreational fisheries from accidental events associated with a CPA proposed action would be minimal. The inclusion of 181 South Area will have no direct routine impacts on recreational fishing due to its distance (130 mi (209 km)) from the nearest shore. Indirect impacts resulting from an incremental increase of vessel trips from activities in the 181 South Area are expected to be negligible.

Routine activities in the CPA such as seismic surveys and pipeline trenching will cause negligible impacts and will not deleteriously affect recreational fishing activities. Indirect impacts to inshore habitats are negligible and indistinguishable from direct impacts of inshore activities on commercial recreational fisheries. Temporary localized impacts from oil spills are anticipated as a result of a CPA proposed action, which would include temporary inconvenience to recreational fishermen and possibly some loss of revenue to facilities supported by recreational fishermen such as boat launches and bait shops.

Recreational Resources (Chapter 4.1.14)

The MMS has reexamined the analysis for recreational resources presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for recreational resources presented in the Multisale EIS. The 181 South Area is located nearly 130 mi (209 km) from the nearest coast, far distant from recreational beaches, out of sight from land, and out of range for most recreational fishing. The inclusion of the 181 South Area is projected to result in a relatively minor amount of additional activity, limiting potential impacts from traffic and from trash and debris. The location of the 181 South Area and limited activities that are expected to result also limit potential impacts from oil spills. Therefore, no additional impacts on recreational resources are projected as a result of the inclusion of the 181 South Area.

While marine debris and nearshore operations, either individually or collectively, may adversely affect the quality of some recreational experiences, they are unlikely to reduce the number of recreational visits to Gulf coastal beaches. It is unlikely that a spill would be a major threat to recreational beaches because any impacts would be short-term and localized, and should have no long-term effect on tourism.

Archaeological Resources (Chapter 4.1.15)

The MMS has reexamined the analysis for prehistoric and historic archaeological resources presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for archaeological resources presented in the Multisale EIS. Given the extreme water depths in the 181 South Area, no prehistoric archaeological resources would likely be encountered in this area. Areas considered by MMS to have a high probability for historic period shipwrecks are located throughout the Gulf of Mexico, including the 181 South Area.

The greatest potential impact to an archaeological resource as a result of routine activities associated with a proposed action in the CPA would result from direct contact between an offshore activity (i.e., platform installation, drilling rig emplacement, and dredging or pipeline project) and a prehistoric or historic site. The archaeological survey and archaeological clearance of sites 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 damage to or loss of significant and/or unique archaeological information. It is expected that coastal archaeological resources will 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 will occur and contact coastal prehistoric or historic archaeological sites from accidental events associated with a 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 would be temporary and reversible.

Human Resources and Land Use

Land Use and Coastal Infrastructure (Chapter 4.1.16.1)

The MMS has reexamined the analysis for land use and coastal infrastructure presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS, the supplemental information found since completion of the Multisale EIS, and the addition of the 181 South Area to the proposed CPA sale area. Although the addition of the 181 South Area resulted in some increases in the activity scenario for a typical CPA proposed action, these minor increases in activity were not significant enough to affect the long-term (i.e., 40-year) forecasts of coastal infrastructure needs to support either a typical CPA sale or the OCS Program. To date, no new information has been found that necessitates a change to the coastal infrastructure scenario presented in the Multisale EIS. The MMS recently analyzed historical data and validated past scenario projections of new pipeline landfalls and new onshore waste disposal sites. Based on the lack of significant new information and MMS's recent analysis, the coastal infrastructure projections have not changed for a proposed lease sale or for the OCS Program.

A proposed action in the CPA (i.e., including the 181 South Area) 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 a 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 clean up of any oil or chemicals spilled.

Demographics (Chapter 4.1.16.2)

The MMS has reexamined the analysis for demographics presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for demographics presented in the Multisale EIS. The 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity; therefore, no additional impacts on employment, or the resulting population and demographics, are projected as a result of the inclusion of the 181 South Area.

A CPA proposed action (including the 181 South Area) is projected to minimally affect the demography of the analysis area. Population impacts from a proposed action are projected to be minimal (<1% of total population) for any EIA in the Gulf of Mexico region. The baseline population patterns and distributions, as projected and described in Chapter 3.3.5.4 of the Multisale EIS, are expected to remain unchanged as a result of a 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 (some of whom may be foreign) projected to move into focal areas, such as Port Fourchon. Accidental events associated with a 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 (Chapter 4.1.16.3)

The MMS has reexamined the analysis for economic factors presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. New economic and demographic data (Woods & Poole Economics, Inc., 2007) analyzed and the addition of the 181 South Area does not change the conclusions in the Multisale EIS, which stated that there would be only minor economic changes in the Texas, Louisiana, Mississippi, Alabama, and Florida EIA's should a proposed CPA lease sale occur. A proposed action is expected to generate less than a 1 percent increase in employment in any of these subareas, even when the net employment impacts from accidental events are included. Most of the employment related to a proposed action is expected to occur in Texas and Louisiana. The demand will be met primarily with the existing population and labor force.

Environmental Justice (Chapter 4.1.16.4)

The MMS has reexamined the analysis for environmental justice presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS and on the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for environmental justice as presented in the Multisale EIS. The 181 South Area is located at the eastern edge of the CPA sale area nearly 130 mi (209 km) from the nearest coast. Also, the 181 South Area is projected to result in a relatively minor amount of additional sale-related activity. This limited activity will have few impacts; the location of the 181 South Area means that any impacts that may result are unlikely to be concentrated in an area that could disproportionately impact minority or low income people. Therefore, no additional impacts on minority or low-income people are projected as a result of the inclusion of the 181 South Area.

Because the proposed CPA sale area lies 3 or more miles (4.8 or more kilometers) offshore, no activities that occur on the resulting leases (and that are regulated by MMS) will impact 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 proposed actions are not expected to have disproportionately high or adverse environmental or health effects on minority or low-income people. The CPA proposed action would help to maintain ongoing levels of activity rather than expand them.

2.2.1.3. Mitigating Measures

The following seven environmental and military mitigations, referred to as lease stipulations, were included for analysis in Chapter 2.4.1.3 of the Multisale EIS. Any stipulations or mitigation requirements to be included in a lease sale will be described in detail in the FNOS for that lease sale. Stipulations or mitigation requirements in addition to the those analyzed in this SEIS can also be developed and applied, and will also be described in detail in the FNOS.

No new lease stipulations were proposed due to the addition of the 181 South Area to the proposed CPA lease sales. Four of the seven stipulations are applicable to the 181 South Area. They are the Military Areas Stipulation, the Evacuation Stipulation, the Coordination Stipulation, and the Protected Species Stipulation (**Figures 2-1 and 2-2**). The Topographic Features Stipulation, the Live Bottom

Stipulation, and the Blocks South of Baldwin County, Alabama, Coast Stipulation are not applicable to the 181 South Area.

The **Topographic Features Stipulation** protects the biota of the topographic features from adverse effects due to routine oil and gas activities, including physical damage from anchoring and rig emplacement and the potential toxic and smothering effects from muds and cuttings discharges. The Topographic Features Stipulation has been included in leases since 1973 and has effectively prevented damage to the biota of these banks from routine oil and gas activities such as anchoring. Monitoring studies have demonstrated that the shunting requirements of the stipulation are effective in preventing the muds and cuttings from impacting the biota of the banks. Although the deferral of blocks with topographic features has been analyzed as an alternative in EIS's and EA's for all recent CPA and WPA sales, this alternative has never been selected. The topographic highs on and near these blocks are often associated with salt domes, which are attractive areas for hydrocarbon exploration. Instead, blocks on the topographic features have been offered for lease with a stipulation that has proven effective in protecting sensitive biological resources. The location of the blocks affected by the Topographic Features Stipulation is shown on **Figure 2-1**.

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** shows the military warning areas in the Gulf of Mexico.

The **Protected Species Stipulation** has been applied to all blocks leased in the GOM since December 2001. This stipulation was developed in consultation with DOC, National Oceanic and Atmospheric Administration (NOAA), NMFS, and FWS in accordance with Section 7 of the Endangered Species Act of 1973 (ESA) and is designed to minimize or avoid potential adverse impacts to federally protected species.

The **Live Bottom (Pinnacle Trend) Stipulation** covers a small portion of the northeastern CPA sale area that is characterized by a pinnacle trend, which is classified as a live bottom under the stipulation. The MMS developed the stipulation to protect biological resources in the Pinnacle Trend in response to concerns that disturbing any of the series of topographic irregularities might adversely affect biological communities that have developed on the surfaces of the features and affect the habitat they provide for pelagic fishes. The stipulation requires avoidance of the features during the placement of oil and gas structures and the laying of pipelines. The stipulation has been adopted in CPA sales since 1990 and has been effective in protecting the features and resident biological communities from damage. The location of the blocks affected by the Live Bottom (Pinnacle Trend) Stipulation is shown on **Figure 2-1**.

The **Evacuation Stipulation** would apply to any lease in the easternmost portion of the CPA sale area. This stipulation was developed in consultation with the U.S. Department of Defense (DOD) to address specific potential use conflict issues between oil and gas operations and military operations in the GOM. An evacuation stipulation has been applied to all blocks leased in this area since 2001. This stipulation would provide for the evacuation of personnel and the shut-in of operations during any events conducted by the military that could pose a danger to ongoing oil and gas operations. It is expected that these measures will serve to eliminate dangerous conflicts between oil and gas operations and military operations.

The **Coordination Stipulation** would apply to any lease in the easternmost portion of the CPA sale area. This stipulation was developed in consultation with DOD to address specific potential use conflict issues between oil and gas operations and military operations in the GOM. A coordination stipulation has been applied to all blocks leased in this area since 2001. This stipulation would provide for the review of pending oil and gas operations by military authorities and could result in delaying oil and gas operations if military activities have been scheduled in the area that may put the oil and gas operations and personnel at risk.

The **Blocks South of Baldwin County, Alabama, Stipulation** will be included only on leases south of and within 15 mi (24 km) of Baldwin County, Alabama (**Figure 2-1**). For several years, the Governor of Alabama has continually indicated opposition to new leasing south and within 15 mi (24 km) of Baldwin County but has requested that, if the area is offered for lease, a lease stipulation to reduce the potential for visual impacts be applied to all new leases in this area. Prior to the decision in 1999 on the

Final Notice of Sale for Sale 172, the MMS, 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 Central Gulf of Mexico lease sales since 1999.

2.2.2. Alternative B—The Proposed Actions Excluding the Unleased Blocks Near the Biologically Sensitive Topographic Features

2.2.2.1. Description

Alternative B differs from Alternative A by not offering the blocks that are possibly affected by the proposed Topographic Features Stipulation (**Chapter 2.2.1.3.1** and **Figure 2-1)**. All of the assumptions (including the six other potential mitigating measures) and estimates are the same as for Alternative A. A description of Alternative A is presented in **Chapter 2.2.1.1**.

No topographic features are located in the 181 South Area; therefore, no blocks located in the 181 South Area would be excluded under Alternative B.

2.2.2.2. Summary of Impacts

The analyses of impacts summarized in **Chapter 2.2.1.2** and described in detail in **Chapter 4.1** 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 assumption that the levels of activity for Alternative B are essentially the same as those projected for the proposed actions leads to the conclusion that the impacts expected to result from Alternative B would be very similar to those described under the proposed actions (**Chapter 4.1**). Therefore, the regional impact levels for all resources, except for the topographic features, would be similar to those described under the proposed actions. 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.

2.2.3. Alternative C—The Proposed Actions Excluding the Unleased Blocks within 15 Miles of the Baldwin County, Alabama, Coast

2.2.3.1. Description

Alternative C differs from Alternative A by not offering any unleased blocks within 15 mi (24 km) of the Baldwin County, Alabama, coast. All of the assumptions (including the six other potential mitigating measures) and estimates are the same as for Alternative A (**Chapters 2.2.1.3 and 4.1**). A description of Alternative A is presented in **Chapter 2.2.1.1**. The coastal region adjacent to the area considered under Alternative C is designated EIA AL-1 (**Figure 2-3**).

The 181 South Area is located more than 90 mi (145 km) south of the Baldwin County, Alabama, coast; therefore, no blocks located in the 181 South Area would be excluded under Alternative C.

2.2.3.2. Summary of Impacts

The analyses of impacts summarized **Chapter 2.2.1.2** and described in detail in **Chapter 4.1** 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 C is that under Alternative C no oil and gas activity would take place in blocks within 15 mi (24 km) of the Baldwin County coast (**Figure 2-1**). The assumption that the levels of activity for Alternative C are essentially the same as those projected for the proposed actions leads to the conclusion that the impacts expected to result from Alternative C would be very similar to those described under the proposed actions (**Chapter 4.1**). Therefore, the regional impact levels for all resources, except recreational beaches, would be similar to those described under the proposed actions. This alternative, if adopted, would reduce the potential aesthetic impacts to recreational beaches along the Baldwin County coast.

2.2.4. Alternative D—No Action

2.2.4.1. Description

Alternative D is the cancellation of one or more of the proposed CPA lease sales including leases that would be offered in the 181 South Area. The opportunity for development of the estimated 0.807-1.336 BBO and 3.365-5.405 Tcf of gas that could have resulted from a proposed lease sale would be precluded or postponed. Any potential environmental impacts resulting from the proposed lease sales would not occur or would be postponed.

2.2.4.2. Summary of Impacts

If Alternative D is selected, all impacts, positive and negative, associated with the proposed lease sales discussed in **Chapter 4.1** would be eliminated. . The incremental contribution of the proposed lease sales to cumulative effects would also be foregone, but effects from other activities, including other OCS lease sales, would remain.

If a lease sale would be 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 CPA would only be reduced by a small percentage, if any. Therefore, the cancellation of one lease sale would not significantly change the environmental impacts of overall OCS activity. However, the cancellation of a 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.

2.3. Proposed Western Planning Area Lease Sales 210, 215, and 218

The following three alternatives were included for analysis in the Multisale EIS. As explained in **Chapter 2.1.3.2** of this SEIS, the Use of a Nomination and Tract Selection Leasing System Alternative was not included for analysis in this SEIS due to an ongoing MMS study on alternative approaches to leasing.

2.3.1. Alternative A—The Proposed Actions

2.3.1.1. Description

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

(1) whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary; and

(2) for Sales 210 and 215 only, whole and partial blocks that lie within the 1.4-nmi buffer zone north of the continental shelf boundary between the U.S. and Mexico.

The WPA sale area encompasses about 28.7 million ac. Approximately 18.3 million ac (64%) of the WPA sale area is currently unleased. The estimated amount of resources projected to be developed as a result of any one proposed WPA lease sale is 0.242-0.423 BBO and 1.644-2.647 Tcf of gas.

The analyses of impacts summarized below and described in detail in **Chapter 4.1** 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**.

2.3.1.2. Summary of Impacts

Air Quality (Chapter 4.1.1)

The MMS has reexamined the analysis for air quality presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for air quality presented in the Multisale EIS.

Emissions of pollutants into the atmosphere from the routine activities associated with the proposed action in the WPA 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 (NAAQS). 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 a proposed action are not expected to have concentrations that would change onshore air quality classifications.

Water Quality

Coastal Waters (Chapter 4.1.2.1)

The MMS has reexamined the analysis for water quality presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for water quality presented in the Multisale EIS.

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. Impacts from routine activities associated with a proposed action would be minimal if all existing regulatory requirements are met. Smaller spills (<1,000 bbl) are not expected to significantly impact water quality in coastal waters. Larger spills, however, could impact water quality in coastal waters. Accidental chemical spills, release of SBF, and blowouts would temporary localized impacts on water quality.

Marine Waters (Chapter 4.1.2.2)

The MMS has reexamined the analysis for water quality presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for water quality presented in the Multisale EIS.

Marine 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 cause 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 m (328 ft) adjacent to the point of discharge. Structure installation and removal and pipeline placement disturbs the sediments and causes increased turbidity. In addition, marine water impacts result from supply and service-vessel bilge and ballast water discharges. Impacts from routine activities associated with a proposed action would be minimal if all existing regulatory requirements are met. Smaller spills (<1,000 bbl) are not expected to significantly impact water quality in marine waters. Larger spills, however, could impact water quality in marine waters. Accidental chemical spills, release of SBF, and blowouts would have temporary localized impacts on water quality.

Sensitive Coastal Environments

Coastal Barrier Beaches and Associated Dunes (Chapter 4.1.3.1)

The MMS has reexamined the analysis for barrier islands and associated dunes presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for barrier islands and associated dunes presented in the Multisale EIS.

Routine activities in the WPA such as increased vessel traffic, maintenance dredging of navigation canals, and pipeline emplacement will cause negligible impacts and will not deleteriously affect barrier beaches and associated dunes. Indirect impacts from routine impacts are negligible and indistinguishable from direct impacts of onshore activities. The potential impacts from accidental events, primarily oil spills, are anticipated to be minimal.

Wetlands (Chapter 4.1.3.2)

The MMS has reexamined the analysis for wetlands presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for wetlands presented in the Multisale EIS

Effects to coastal wetlands from the primary impact-producing activities associated with a proposed action are expected to be low. The primary impact-producing activities associated with routine activities for the WPA proposed action that could affect wetlands include pipeline emplacement, construction and maintenance, navigation channel use (vessel traffic) and maintenance, disposal of OCS-related wastes, and the use and construction of support infrastructure in these coastal areas. Vessel traffic associated with a proposed action is expected to contribute minimally to the erosion and widening of navigation channels and canals.

Routine activities in the WPA such as pipeline emplacement, navigational channel use, maintenance dredging, disposal of OCS wastes, and construction and maintenance of OCS support infrastructure in coastal wetlands are expected to result in low impacts. Indirect impacts from wake erosion and saltwater intrusion are expected to result in low impacts, which are indistinguishable from direct impacts from inshore activities. The potential impacts from accidental events, primarily oil spills, are anticipated to be minimal.

Seagrass Communities (Chapter 4.1.3.3)

The MMS has reexamined the analysis for seagrass communities presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for seagrass communities presented in the Multisale EIS.

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

Sensitive Offshore Benthic Resources

Topographic Features (Chapter 4.1.4.2)

The MMS has reexamined the analysis for topographic features presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for topographic features presented in the Multisale EIS. New information was found that supports previous assessments and illustrates the potential effects of natural events, especially the cumulative impacts of hurricanes.

The full analyses of the potential impacts of routine activities and accidental events associated with a WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in **Chapter 4.1**. A summary of these potential impacts are as follows. The routine activities associated with a WPA proposed action 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 Feature 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 would keep subsurface sources of spills away from the immediate vicinity of topographic features.

Chemosynthetic and Nonchemosynthetic Deepwater Benthic Communities (Chapter 4.1.5)

The MMS has reexamined the analysis for continental slope and deepwater resources presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for continental slope and deepwater resources presented in the Multisale EIS.

Chemosynthetic and nonchemosynthetic communities are susceptible to physical impacts from structure placement, anchoring, and pipeline installation associated with a proposed action; however, the provisions of NTL 2000-G20 greatly reduce the risk of these physical impacts by requiring 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 from 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 a proposed action are expected to cause little damage to the ecological function or biological productivity of the widespread, low-density chemosynthetic communities and the widespread, typical, deep-sea benthic communities.

Marine Mammals (Chapter 4.1.6)

The MMS has reexamined the analysis of the 29 species of marine mammals occurring in the Gulf of Mexico presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for marine mammals presented in the Multisale EIS.

Routine events related to a proposed action in the WPA, particularly when mitigated as required by MMS, are not expected to have long-term adverse effects on the size and productivity of any marine mammal species or population endemic to the northern Gulf of Mexico. Characteristics of impacts from accidental events depend on chronic or acute exposure resulting in harassment, harm, or mortality to marine mammals, while exposure to dispersed hydrocarbons is likely to result in sublethal impacts.

Sea Turtles (Chapter 4.1.7)

The MMS has reexamined the analysis for the five sea turtles species that inhabit the Gulf of Mexico presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. While information from the 5-year status reviews for federally listed sea turtles in the Gulf of Mexico was incorporated, there was no significant new information that would alter the impact conclusion for sea turtles presented in the Multisale EIS, and FWS and NMFS recommended that the current listing classifications remain unchanged.

The routine activities of a proposed action in the WPA, when mitigated as required by MMS, are unlikely to have significant adverse effects on the size and recovery of any sea turtle species or population in the Gulf of Mexico. Accidental events associated with a proposed action have the potential to impact small to large numbers of sea turtles. Populations of sea turtles in the northern Gulf of Mexico would be exposed to residuals of oils spilled as a result of a 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 most foreseeable cases, exposure to hydrocarbons persisting in the sea following the dispersal of an oil slick will result in sublethal impacts.

Coastal and Marine Birds (Chapter 4.1.9)

The MMS has reexamined the analysis for coastal and marine birds presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for coastal and marine birds presented in the Multisale EIS.

The majority of effects resulting from routine activities associated with a proposed action in the WPA on endangered/threatened and nonendangered/nonthreatened coastal and marine birds are expected to be sublethal. The routine activities include behavioral effects, exposure to or intake of OCS-related contaminants or discarded debris, temporary disturbances, and displacement of localized groups from impacted habitats. Impacts from potential oil spills associated with a proposed action and oil-spill cleanup on birds are expected to be negligible; however, small amounts of oil can affect birds, and there are possible delayed impacts on their food supply.

Fish Resources and Essential Fish Habitat (Chapter 4.1.11)

The MMS has reexamined the analysis for fisheries and EFH) presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for fisheries and EFH presented in the Multisale EIS.

Fish resources and EFH could be impacted by coastal environmental degradation, marine environmental degradation, pipeline trenching, and offshore discharges of drilling discharges and produced waters associated with routine activities. The impact of coastal and marine environmental degradation is expected to cause an undetectable decrease in fish resources or in EFH. Impacts of routine discharges are localized in time and space and are regulated by USEPA permits and will have minimal impact. Accidental events that could impact fish resources and EFH include blowouts and oil or chemical spills. A subsurface blowout would have a negligible effect on Gulf of Mexico fish resources. If spills due to a proposed action were to occur in open waters of the OCS proximate to mobile adult finfish or shellfish, the effects would likely be nonfatal and the extent of damage would be reduced due to the capability of adult fish and shellfish to avoid a spill.

Commercial Fishing (Chapter 4.1.12)

The MMS has reexamined the analysis for commercial fishing presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. New fishery statistics analyzed do not change the conclusion in the Multisale EIS that impacts on the commercial fisheries from the proposed action would be minimal.

Routine activities in the WPA such as seismic surveys and pipeline trenching will cause negligible impacts and will 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, a well blowout or an oil spill, associated with either a WPA action are anticipated to be minimal. Commercial fishermen are anticipated to avoid the area of a well blowout or an oil spill. Any impact on catch or value of catch would be insignificant compared with natural variability.

Recreational Fishing (Chapter 4.1.13)

The MMS has reexamined the analysis for recreational fishing presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. New information was not significantly different from that provided in the Multisale EIS; therefore, no information was found that would alter the conclusions in the Multisale EIS that impacts on the recreational fisheries from accidental events associated with a WPA action would be minimal.

Routine activities in the WPA such as seismic surveys and pipeline trenching will cause negligible impacts and will not deleteriously affect recreational fishing activities. Indirect impacts to inshore habitats are negligible and indistinguishable from direct impacts of inshore activities on commercial recreational fisheries. Temporary localized impacts from oil spills are anticipated as a result of a WPA action. These impacts would include temporary inconvenience to recreational fishermen and possibly some loss of revenue to facilities supported by recreational fishermen such as boat launches and bait shops.

Recreational Resources (Chapter 4.1.14)

The MMS has reexamined the analysis for recreational resources presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for recreational resources presented in the Multisale EIS.

Routine impacts from marine debris and nearshore operations, either individually or collectively, may adversely affect the affect the quality of some recreational experiences but are unlikely to reduce the number of recreational visits to Gulf coastal beaches. It is unlikely that a spill would be a major threat to recreational beaches because any impacts would be short-term and localized, and should have no long-term effect on tourism.

Archaeological Resources (Chapter 4.1.15)

The MMS has reexamined the analysis for prehistoric and historic archaeological resources presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for archaeological resources presented in the Multisale EIS.

The greatest potential impact to an archaeological resource as a result of routine activities associated with a proposed action in the WPA would result from direct contact between an offshore activity (platform installation, drilling rig emplacement, and dredging or pipeline project) and a prehistoric or historic site. The archaeological survey and archaeological clearance of sites 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 damage to or loss of significant and/or unique archaeological information. It is expected that coastal archaeological resources will 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 will occur and contact coastal prehistoric or historic archaeological sites from accidental events associated with a 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 would be temporary and reversible.

Human Resources and Land Use

Land Use and Coastal Infrastructure (Chapter 4.1.16.1)

The MMS has reexamined the analysis for land use and coastal infrastructure presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. To date, no new information has been found that necessitates a change to the coastal infrastructure scenario presented in the Multisale EIS. The MMS recently analyzed historical data and validated past scenario projections of new pipeline landfalls and new onshore waste disposal sites. Based on the lack of significant new information and MMS's recent analysis, the coastal infrastructure projections have not changed for a proposed lease sale or for the OCS Program.

A proposed action in the WPA would not require additional coastal infrastructure, with the exception of possibly one new gas processing facility and one new pipeline landfall, and 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 a 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 clean up of any oil or chemicals spilled.

Demographics (Chapter 4.1.16.2)

The MMS has reexamined the analysis for demographics presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for demographics presented in the Multisale EIS.

A WPA proposed action is projected to minimally affect the demography of the analysis area. Population impacts from a proposed action are projected to be minimal (<1% of total population) for any economic impact area (EIA) in the Gulf of Mexico region. The baseline population patterns and distributions are expected to remain unchanged as the result of a 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 (some of whom may be foreign) projected to move into focal areas, such as Port Fourchon. Accidental events associated with a proposed action such as oil or chemical spills, blowouts, and vessel collisions would have likely have no effects on the demographic characteristics of the Gulf coastal communities.

Economic Factors (Chapter 4.1.16.3)

The MMS has reexamined the analysis for economic factors presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. New economic and demographic data (Woods & Poole Economics, Inc., 2007) analyzed does not change the conclusions in the Multisale EIS, which stated that there would be only minor economic changes in the Texas, Louisiana, Mississippi, Alabama, and Florida EIA's should a proposed WPA lease sale occur.

A WPA proposed action is expected to generate less than a 1 percent increase in employment in any of these subareas, even when the net employment impacts from accidental events are included. Most of the employment related to a proposed action is expected to occur in Texas and Louisiana. The demand will be met primarily with the existing population and labor force.

Environmental Justice (Chapter 4.1.16.4)

The MMS has reexamined the analysis for environmental justice presented in the Multisale EIS, based on the additional information available since the publication of the Multisale EIS. No significant new information was found that would alter the impact conclusion for environmental justice as presented in the Multisale EIS.

Because the proposed WPA sale area lies 3 or more miles (4.8 or more kilometers) offshore, no activities that occur on the resulting leases (and that are regulated by MMS) will impact 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 proposed actions is not expected to have disproportionately high or adverse environmental or health effects on minority or low-income people. The WPA proposed action would help to maintain ongoing levels of activity rather than expand them.

2.3.1.3. Mitigating Measures

The following four environmental and military mitigations, referred to as lease stipulations, were included for analysis in the Multisale EIS (Chapter 2.3.1.3 of the Multisale EIS). Any stipulations or mitigation requirements to be included in a lease sale will be described in detail in the FNOS for that lease sale. Stipulations or mitigation requirements in addition to the those analyzed in this SEIS can also be developed and applied, and will also be described in detail in the FNOS.

The **Topographic Features Stipulation** protects the biota of the topographic features from adverse effects due to routine oil and gas activities, including physical damage from anchoring and rig emplacement and the potential toxic and smothering effects from muds and cuttings discharges. The Topographic Features Stipulation has been included in leases since 1973 and has effectively prevented damage to the biota of these banks from routine oil and gas activities such as anchoring. Monitoring studies have demonstrated that the shunting requirements of the stipulation are effective in preventing the muds and cuttings from impacting the biota of the banks. Although the deferral of blocks with topographic features has been analyzed as an alternative in EIS's and EA's for all recent CPA and WPA sales, this alternative has never been selected. The topographic highs on and near these blocks are often associated with salt domes, which are attractive areas for hydrocarbon exploration. Instead, blocks on the topographic features have been offered for lease with a stipulation that has proven effective in protecting sensitive biological resources. The location of the blocks affected by the Topographic Features Stipulation is shown on **Figure 2-1**.

The **Naval Mine Warfare Area Stipulation** (formerly the Operations in the Naval Mine Warfare Area Stipulation) would apply to whole and partial blocks located in the Naval Mine Warfare Command Operational Area D (**Figure 2-1)** to eliminate potential impacts from multiple-use conflicts on these blocks. The U.S. Navy's Mine Warfare Training Program, based in Corpus Christi, Texas, conducts training exercises in waters offshore Corpus Christi. The MMS and the Navy entered into a formal agreement in 1994 providing that these blocks could be offered for lease with a special stipulation. The MMS continues to consult periodically with the Navy, and they request that MMS continue to apply the lease stipulation restricting oil and gas operations on these blocks to ensure the safe use of these areas for mine warfare training.

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** shows the military warning areas in the Gulf of Mexico.

The **Protected Species Stipulation** has been applied to all blocks leased in the Gulf of Mexico since December 2001. This stipulation was developed in consultation with DOC, NOAA, NMFS, and FWS in accordance with Section 7 of the ESA and is designed to minimize or avoid potential adverse impacts to federally protected species.

2.3.2. Alternative B—The Proposed Actions 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 possibly affected by the proposed Topographic Features Stipulation (**Chapter 2.3.1.3.1** and **Figure 2-1**). All of the assumptions (including the three other potential mitigating measures) 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** 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 assumption that the levels of activity for Alternative B are essentially the same as those projected for the proposed actions leads to the conclusion that the impacts expected to result from Alternative B would be very similar to those described under the proposed actions (**Chapter 4.1**). Therefore, the regional impact levels for all resources, except for the Topographic Features, would be similar to those described under the proposed actions. 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 one or more of the proposed WPA lease sales. The opportunity for development of the estimated 0.242-0.423 BBO and 1.644-2.647 Tcf of gas that could have resulted from a proposed lease sale would be precluded or postponed. Any potential environmental impacts resulting from the proposed lease sales would not occur or would be postponed.

2.3.3.2. Summary of Impacts

If Alternative C is selected, all impacts, positive and negative, associated with the proposed lease sales discussed in **Chapter 4.1** would be eliminated. The incremental contribution of the proposed lease sales to cumulative effects would also be foregone, but effects from other activities, including other OCS lease sales, would remain.

If a lease sale would be 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 one lease sale would not significantly change the environmental impacts of overall OCS activity. However, the cancellation of a 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.

CHAPTER 3

IMPACT-PRODUCING FACTORS AND SCENARIO

3. IMPACT-PRODUCING FACTORS AND SCENARIO

In order to describe the level of activity that could reasonably result from a proposed action (i.e., proposed lease sale), MMS developed exploration and development activity scenarios. These scenarios provide a framework for analyses of potential environmental and socioeconomic impacts of a proposed lease sale. Chapter 4.1.1 of the Multisale EIS describes the offshore impact-producing factors and scenario associated with the proposed lease sales that could potentially affect the biological, physical, and socioeconomic resources of the Gulf of Mexico, while Chapter 4.1.2 of the Multisale EIS describes coastal impact-producing factors and scenario. Chapter 4.1.3 of the Multisale EIS discusses non-OCS activities that could potentially affect the same biological, physical, and socioeconomic resources. This information is summarized below, and new information and information specific to the 181 South Area has been incorporated.

The potential impacts of the offshore and coastal activities associated with a proposed lease sale are considered in the environmental analysis sections in **Chapter 4** of this SEIS.

3.1. IMPACT-PRODUCING FACTORS AND SCENARIO—ROUTINE OPERATIONS

3.1.1. Offshore Impact-Producing Factors and Scenario

Offshore is defined here as the OCS portion of the Gulf of Mexico that begins 10 mi (16 km) offshore Florida; 3 nmi (6 km) offshore Louisiana, Mississippi, and Alabama; and 3 leagues (17 km) offshore Texas; and it extends seaward to the limits of the U.S. OCS (**Figure 1-1**). Chapter 4.1.1 of the Multisale EIS describes the infrastructure and activities (impact-producing factors) that would occur offshore as a result of the proposed actions (i.e., proposed lease sales)

The projections used to develop the offshore proposed action scenarios are based on resource estimates as summarized in the *Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf 2006* (USDOI, MMS, 2006a), current industry information, and historical trends.

The proposed action scenarios are based on the following factors:

- recent trends in the amount and location of leasing, exploration, and development activity;
- estimates of undiscovered, unleased, conventionally recoverable oil and gas resources in the planning area;
- existing offshore and onshore oil and/or gas infrastructure;
- industry information; and
- oil and gas technologies, and the economic considerations and environmental constraints of these technologies.

In order to present the best reasonable projections possible, MMS continually updates models and formulas used to develop these scenarios. The experience of subject matter experts is incorporated into this process, along with the latest industry trends and historical data.

Each proposed lease sale is represented by a set of ranges for resource estimates, projected exploration and development activities, and impact-producing factors. Each of the proposed lease sales is expected to be within the scenario ranges; therefore, a proposed lease sale is representative of the individual proposed sales in each sale area. Notwithstanding these unpredictable factors, the scenarios used in this SEIS represent the best assumptions and estimates of a set of future conditions that are considered reasonably foreseeable and suitable for presale impact analyses. These scenarios do not represent an MMS recommendation, preference, or endorsement of any level of leasing or offshore operations, or of the types, numbers, and/or locations of any onshore operations or facilities.

Analysis Period

The MMS assumes fields discovered as a result of a proposed action will reach the end of their economic life within 40 years of the lease sale. Activity levels are not projected beyond 40 years. This is based on averages for time required for exploration, development, production life, and decommissioning for leases in the Gulf of Mexico.

Addition of the 181 South Area

As mandated by GOMESA, proposed CPA lease Sale 208 in 2009, Sale 213 in 2010, Sale 216 in 2011, and Sale 222 in 2012 would include the 181 South Area. The 181 South Area is located in extremely deep water. Deepwater oil and gas infrastructure is less dense than shallow water with much higher production to structure and well ratios. Production has started as of October 2007 from nine fields that are part of the Independence Hub project in water depths >2,400 m (7,874 ft). As of November 2007, 68 wells have been drilled and one platform has been installed in water depths >2,400 m (7,874 ft).

The MMS, Gulf of Mexico OCS Region, Resource and Evaluation Office's Modeling and Forecasting Team has reevaluated the exploration and development activity scenario for a CPA proposed action due to the addition of the 181 South Area. Relative to CPA and WPA sales, a very small amount of exploration and development activity is forecasted to occur as a result of the addition of this area per proposed CPA lease sale. The forecasted level of activity considered the extreme water depth of the 181 South Area, the amount of interest in these water depths in recent lease sales, and the lack of recent seismic data for the 181 South Area.

Up to one additional production structure and 9-12 additional wells are projected for an individual CPA sale as a result of the addition of the 181 South Area. Like other deepwater developments, this production structure would likely be a centrally located host facility, and the 9-12 additional wells would be subsea wells located within 10 mi (16 km) of the host facility.

Resource Estimates and Timetables

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. The estimates of undiscovered, unleased, conventionally recoverable oil and gas resources are based upon a comprehensive appraisal of the conventionally recoverable petroleum resources of the Nation as of January 1, 2003. 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. A summarized discussion of the methodologies employed and the results obtained in the assessment are presented in the MMS brochure entitled, *Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf 2006* (USDOI, MMS, 2006a). 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. A profusion of historical databases and information derived from oil and gas exploration and development activities are available to MMS 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 the proposed action based on an actual range of historic observations.

Table 3-1 presents the projected oil and gas production for the proposed lease sales. Major impact-producing factors including the number of exploration and delineation wells, production platforms, and development wells projected to develop and produce the estimated resources for a CPA or WPA 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. The proposed lease sale areas were divided into offshore subareas based upon ranges in water depth (**Figure 3-1**) that reflect the technological requirements and related physical and economic impacts.

For purposes of analysis, the life of the leases resulting from a proposed action is assumed to not exceed 40 years. Sale areawide exploratory drilling activity would take place over an 8-year period, beginning within one 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 through the 40th year. Final abandonment and removal activities occur in the 40th year.

Activity as the result of a lease sale is assumed to be staggered over time. A recently published MMS study, which estimated physical and economic performance measures to characterize lease sales and development in the Gulf of Mexico, was used to further refine the scenario presented in the Multisale EIS (Iledare and Kaiser, 2007). The average lag of exploration and production from leases issued from 1983 to 1999 increased by water depth and decreased over time as shown in the **Tables 3-4 and 3-5**. Due to variation by water depth, exploration and production activity is staggered over time, taking on average 1.9-4.5 years after a lease sale before exploration begins and 3.4-8.3 years before first production. Therefore, it is likely that production from the 181 South Area would likely begin eight or more years after a lease sale.

3.1.1.1. Exploration and Delineation

3.1.1.1.1. Seismic Surveying Operations

Chapter 4.1.1.2.1 of the Multisale EIS describes geophysical seismic surveys that are performed to obtain information on surface and near-surface geology and on subsurface geologic formations. High-resolution (shallow hazard) surveys are conducted as authorized under the terms and conditions of the lease agreement, and are referred to as postlease surveys. Prelease surveys take into account seismic work performed off-lease (or on otherwise leased areas), focused most commonly (but not always) on deeper targets and collectively authorized under MMS's G&G permitting process.

Postlease, high-resolution seismic surveys collect data on surficial geology used to identify potential shallow geologic hazards for engineering and site planning for bottom-founded structures. They are also used to identify environmental resources such as chemosynthetic community habitat and associated hydrate production.

Typical prelease seismic surveying operations tow an array of airguns and a streamer (signal receiver cable) behind the vessel 5-10 m (16-33 ft) below the sea surface. The airgun array produces a burst of underwater sound by releasing compressed air into the water column that creates an acoustical energy pulse. These streamers (acoustic receiver cables) are 3-6 mi (5-10 km) or greater in length. Vessel speed is typically 4.5-6 knots (kn) (about 4-8 miles per hour (mph)) with gear deployed.

The 3D surveys carried out by seismic vendors can consist of several hundred OCS blocks. Multiple-source and multiple-streamer technologies are often used for 3D seismic surveys. A typical 3D survey might employ a dual array of 18 guns per array. Each array might emit a 3,000-in^3 burst of compressed air at 2,000 pounds per square inch (psi), generating approximately 4,500 kilojoule (kJ) of acoustic energy for each burst. At 10 m (33 ft) from the source, the pressure experienced is approximately ambient pressure plus 1 atmosphere (atm). A series of 3D surveys collected over time, simulating the exact acquisition parameters, commonly referred to as a four-dimensional (4D) or time-lapse survey, is used mainly for reservoir management. It is used to monitor how a reservoir has been drained to optimize the amount of hydrocarbon that is produced.

At present, limited geophysical seismic data exist for the 181 South Area, which is one reason MMS has chosen not to offer the 181 South Area until 2009. The 181 South Area, along with certain other areas, were previously placed off limits for oil and gas leasing through a series of moratoria dating back to June 26, 1990. The Gulf of Mexico Energy Security Act of 2006 repealed the moratoria on the 181 South Area. Under the moratoria, no funds could be expended by the Department of the Interior to conduct offshore oil and gas leasing and related activities, but the moratoria did not prohibit the acquisition of geological and geophysical data by oil and gas operators. Several recent geophysical surveys have been acquired in the area. Since 2000, MMS has issued five 2D permits for seismic surveys, totaling 37,000 mi^2 (95,830 km^2) and three 3D seismic surveys totaling 420 OCS blocks (3,780 mi^2; 9,790 km^2) within the 181 South Area. The MMS is currently reviewing an application to conduct a 3D survey in the Lloyd Ridge Area (northern half of the 181 South Area). If approved, the survey would take about 1 year for acquisition and 6 months for processing. The availability of the 181 South Area for leasing may encourage companies and contractors to apply for additional permits in adjacent areas of the CPA and EPA.

3.1.1.1.2. Exploration and Delineation 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 determine if a resource exists. If a resource is discovered in quantities appearing to be economic, one or more follow-up delineation wells help define the amount of resource or the extent of the reservoir.

In the Gulf of Mexico, exploration and delineation wells are typically drilled with mobile offshore drilling units (MODU's); for example, jack-up rigs, semisubmersible rigs, or drillships. 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 table below indicates the depth ranges for exploration rigs used in this analysis for Gulf of Mexico MODU's.

MODU or Drilling Rig Type	Water-Depth Range
Jack-up	≤100 m
Semisubmersible	100-3,000 m
Drillship	≥600 m

The scenarios for the proposed actions presented in the Multisale EIS assumed that an average exploration/delineation well will require 30-45 days to drill. Wells drilled in and near the 181 South Area could take 100-120 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.

The cost of an ultra-deepwater well (>6,000-ft or >1,829-m water depth) can be $30-$50 million or more, without certainty that objectives can be reached. Some recent ultra-deepwater exploration wells in the Gulf of Mexico have been reported to have cost upwards of $100 million.

The MMS requires that operators conduct their offshore operations in a safe manner. Subpart D of the MMS's operating regulations (30 CFR 250) provides guidance to operators on drilling activities. For example, operators are required by 30 CFR 250.400 to take necessary precautions to keep their wells under control at all times using the best available and safest drilling technology (NTL 99-G01; "Deepwater Emergency Well Control Operations"). Deepwater areas pose some unique concerns regarding well-control activities. In 1998, the International Association of Drilling Contractors (IADC) published deepwater, well-control guidelines (IADC, 1998) to assist operators in this requirement. These guidelines address well planning, well-control procedures, equipment, emergency response, and specialized training for drilling personnel.

Drilling rig availability is still a limiting factor for activity in the Gulf. The 181 South Area would encounter the same rig availability issues as the rest of the Gulf.

Tables 3-2 and 3-3 show the estimated range of exploration and delineation wells by water depth subarea for a CPA and WPA proposed action, respectively.

3.1.1.2. Development and Production

3.1.1.2.1. Development and Production Drilling

Delineation and production wells are sometimes collectively termed development wells. Development wells may be drilled from movable structures, such as jack-up rigs, fixed bottom-supported structures, floating vertically-moored structures, floating production facilities, and drillships (either anchored or dynamically positioned drilling vessels).

The type of production structure installed at a site depends mainly on water depth, but the total facility lifecycle, the type and quantity of hydrocarbon production expected, the number of wells to be drilled, and the number of anticipated tie backs from other fields can also influence an operator's procurement decision. The number of wells per structure varies according to the type of production structure used, the prospect size, and the drilling/production strategy deployed for the drilling program and for resource conservation. Production systems can be fixed, floating, or increasingly in deep water, subsea. Due to the extreme water depths, production systems in and near the 181 South Area would be floating or subsea.

The MMS has described and characterized production structures in its deepwater reference document (Regg et al., 2000) and descriptions are summarized in Chapter 3.3.5.7.1 of the Multisale EIS. In water depths of up to 400 m (1,312 ft), the scenarios assume that conventional, fixed platforms that are rigidly attached to the seafloor will be the type of structure preferred by operators. In water depths of <200 m (656 ft), 20 percent of the platforms are expected to be manned (defined as having sleeping quarters on the structure). In depths between 200 and 400 m (656 and 1,312 ft), all structures are assumed to be manned. It is also assumed that helipads will be located on 66 percent of the structures in water depths <60 m (197 ft), on 94 percent of structures in water depths between 60 and 200 m (656 ft), and on 100 percent of the structures in water depths >200 m (656 ft). At water depths >400 m (1,312 ft), platform designs based on rigid attachment to the seafloor are not expected to be used. The 400-m (1,312-ft) isobath appears to be the current economic limit for this type of structure.

Tables 3-2 and 3-3 show the estimated range of development wells and production structures by water depth subarea for a CPA and WPA proposed action, respectively. The MMS estimates that 87 percent of development wells would become producing wells.

Deepwater Operations Plans

Deepwater Operations Plans (DWOP's) are required of all deepwater development projects in water depths ≥1,000 ft (305 m) and for all projects proposing subsea production technology. The DWOP is designed to address industry and MMS concerns by allowing an operator to know, well in advance of significant spending, that their proposed methods of dealing with situations not specifically addressed in the regulations are acceptable to MMS. The DWOP provides MMS with information specific to deepwater/subsea equipment issues to demonstrate that a deepwater project is being developed in an acceptable manner. The MMS will review deepwater development activities from a total system perspective, emphasizing the operational safety, environmental protection, and conservation of natural resources. The DWOP was established through the NTL process, which provides for a more timely and flexible approach to keep pace with the expanding deepwater operations and subsea technology. On August 30, 2005, the DWOP requirements were incorporated into MMS operating regulations via revisions to 30 CFR 250 Subpart B.

A conceptual DWOP is required initially and is usually followed by a Development Operations Coordination Document (DOCD).

Development Operations and Coordination Document

The chief planning document that lays out an operator's specific intentions for development is the DOCD. Requirements for lessees and operators submitting a DOCD are addressed in 30 CFR 250.241-250.242, and information guidelines for DOCD's are given in NTL's 2006-G14 and 2006-G15.

Bottom Area Disturbance

Chapters 4.1.1.3.2.1 and 4.1.1.3.3.1 of the Multisale EIS discuss in detail bottom area disturbance from structures emplaced or anchored on the OCS to facilitate oil and gas exploration and production including drilling rigs or MODU's (jack-ups, semisubmersibles, and drillships), pipelines, and fixed surface, floating, and subsea production systems. 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.

Drilling rigs, MODU's, and production structures would individually disturb 1-3 ha (2.5-7 ac) of sea bottom. In water depths >600 m (1,969 ft) including the 181 South Area, dynamically-positioned (DP) drillships could be used, reducing the area of bottom disturbance.

3.1.1.2.2. Infrastructure Presence

3.1.1.2.2.1. Offshore Production Systems

Chapters 3.3.5.7.1 and 4.1.1.3.3 of the Multisale EIS discuss in detail the offshore production systems that would be used to support a proposed lease sale. **Tables 3-2 and 3-3** show the estimated range of production structures by water depth subarea for a CPA and WPA proposed action, respectively. These estimates include up to one additional production structure as a result of the addition of the 181 South Area. Of the production systems discussed, only spars, semisubmersibles, and floating production, storage, and offloading systems (FPSO's) would be used in or near the 181 South Area.

Spar

A spar structure is a deep-draft, floating caisson that may consist of a large-diameter (27.4-36.6 m; 90-120 ft) cylinder or a cylinder with a lower tubular steel trellis-type component (truss spar, a second generation design) that supports a conventional production deck. A third generation of spar design is the cell spar. The cell spar's hull is composed of several identically sized cylinders surrounding a center cylinder. In July 2004, Kerr-McGee began production from the world's first cell spar at Red Hawk (Garden Banks Block 877) in 1,626 m (5,334 ft) of water. The cylinder or hull may be moored via a chain catenary or semi-taut line system connected to 6-20 anchors on the seafloor. Spars are now used in water depths up to 900 m (2,952 ft) and may be used in water depths 3,000 m (9,842 ft) or deeper (Natural Gas.org, 2006; USDOI, MMS, 2006b and c; Oynes, 2006).

Semisubmersibles

Semisubmersible production structures (semisubmersibles) resemble their drilling rig counterparts and are the most common type of offshore drilling rig (NaturalGas.org, 2006a). Semisubmersibles are partially submerged with pontoons that provide buoyancy. Their hull contains pontoons below the waterline and vertical columns to the hull box/deck. The structures keep on station with conventional, catenary or semi-taut, line mooring systems connected to anchors in the seabed. Semisubmersibles can be operated in a wide range of water depths. Floating production systems are suited for deepwater production in depths up to 8,000 ft (2,438 m) (NaturalGas.org, 2006; USDOI, MMS, 2006b and c; Oynes, 2006).

Subsea Production Systems

For some development programs, especially those in deep- and ultra-deepwater, an operator may choose to use a subsea production system instead of a floating production structure. Although the use of subsea systems has recently increased as development has moved into deeper water, subsea systems are not new to the Gulf of Mexico and they are not used exclusively for deepwater development.

Unlike wells from conventional fixed structures, subsea wells do not have surface facilities directly supporting them during their production phases. A subsea production system comprises various bottom-founded components, among them: well templates, well heads, "jumper" connections between well heads, control manifolds, in-field pipelines and their termination sleds, and umbilicals and their termination assemblies. A subsea production system can range from a single-well template connected to a nearby manifold or pipeline, and then to a riser system at a distant production facility; or a series of wells that are tied into the system. Subsea systems rely on a "host" facility for support and well control. Centralized or "host" production facilities in deep water or on the shelf may support several satellite subsea developments. A drilling rig must be brought on location to provide surface support to reenter a well for workovers and other types of well maintenance activities. In addition, should the production safety system fail and a blowout result, surface support must be brought on location to regain control of the well.

Floating Production, Storage, and Offloading Systems

The MMS has prepared an EIS on the potential use of FPSO systems on the Gulf of Mexico OCS (USDOI, MMS, 2002). In accordance with the scenario provided by industry, the FPSO EIS addresses the proposed use of FPSO's in the deepwater areas of the CPA and WPA only. In January 2002, MMS announced its decision to accept applications for FPSO's after a rigorous environmental and safety review.

On June 12, 2007, MMS received a DOCD from Petrobras Americas Inc. proposing to use an FPSO in the Walker Ridge Area to develop two different prospects, Cascade and Chinook. This is the first and only proposal, at this time, to use an FPSO in the Gulf of Mexico. The Cascade Prospect (Walker Ridge Block 206 Unit) is located approximately 250 mi (402 km) south of New Orleans, Louisiana, and about 150 mi (241 km) from the Louisiana coastline in approximately 8,200 ft (2,499 m) of water; the Chinook Prospect (Walker Ridge Block 425 Unit) is located about 16 mi (26 km) south of the Cascade Prospect. The MMS performed a site-specific environmental assessment (EA) for the Cascade-Chinook Prospects, and it was completed in March 2008.

The FPSO system is an especially good production system candidate for deployment in ultra-deepwater situations where the nearest pipeline tiebacks could be hundreds of miles or kilometers away. Operators making recent large discoveries in remote areas, such as in the edge of the Sigsbee Escarpment in the CPA and the Perdido Fold belt in the WPA, may have no recourse other than to deploy an FPSO system to produce discoveries in these areas. Among the challenges facing an FPSO deployment in these areas is the fate of produced gas from the reservoirs. The MMS has funded studies to examine options to safely produce the associated gas reserves. Compressed gas, gas to liquids, liquefied natural gas (LNG), and other options were considered. A new and evolving technology for deepwater development involves the use of minimal floating structures. These buoy-like structures allow the placement of minimal equipment at the surface. They have the advantages of relatively low cost and surface access to the well(s). These structures are dependent on "host" facilities for control and for final processing of the produced hydrocarbons.

3.1.1.2.2.2. Space-Use Conflicts

Chapter 4.1.1.3.3.2 of the Multisale EIS discusses space-use conflicts that may occur during OCS operations, where areas are occupied by seismic vessels, structures, anchor cables and safety zones are unavailable to commercial fishermen. In addition, OCS operations may pose a space-use conflict with potential dredging activities for sand and gravel extraction and military activities (**Chapter 3.3.3**).

The 181 South Area is located within two Eglin Water Test Areas (EWTA's) (**Figure 2-2**). The proposed Military Areas Stipulation would reduce potential impacts, particularly in regards to safety, but does not reduce or eliminate the actual physical presence of oil and gas operations in areas where military operations are conducted. The reduction in potential impacts resulting from this stipulation makes multiple-use conflicts most unlikely. Without the stipulation, some potential conflict is likely. The best indicator of the overall effectiveness of the stipulation may be that there has never been an accident involving a conflict between military operations and oil and gas activities in the Gulf of Mexico.

Commercial fisheries conflicts with platforms in the 181 South Area would be limited to the longline fishery.

Of the production systems discussed, only spars, semisubmersibles, and FPSO's would be used in or near the 181 South Area. The U.S. Coast Guard (USCG) has not yet determined what size navigational safety zone will be required during offloading operations. Factoring in various configurations of navigational safety zones, other deepwater facilities may require up to a 500-m (1,640-ft) radius safety zone or 78 ha (193 ac) of space (USCG regulations, 33 CFR Chapter 1, Part 147.15).

3.1.1.2.2.3. Aesthetic Interference

Chapter 3.1.1.2.2.3 of the Multisale EIS discusses in detail aesthetic interference from oil spills and residue, tarballs, trash and debris, noise, pollution, increased vessel and air traffic, and the presence of drilling and production platforms visible from land. Oil spills, oil residue from tankers cleaning their holding tanks, and tarballs could affect beaches, wetlands, and coastal residences. Increased vessel and air traffic may result in additional noise or in oil and chemical pollution of water in ports and out at sea. The potential visibility of fixed structures in local Gulf of Mexico waters is worrisome for local chambers of commerce and tourist organizations.

An MMS-funded study investigated the abundance and sources of tarballs on the recreational beaches of the CPA (Henry et al., 1993). It was determined that the presence of tarballs along the Louisiana coastline is primarily related to marine transportation activities and that their effect on recreational use is below the level of social and economic concern.

The 181 South Area is located nearly 130 mi (209 km) from the nearest coast, far distant from recreational beaches, out of sight from land, and out of range for most recreational fishing. However, a small increase in vessel traffic is estimated to result from the inclusion of the 181 South Area (**Chapter 3.1.1.4.4**).

3.1.1.2.2.4. Workovers and Abandonments

Chapter 4.1.1.3.4 of the Multisale EIS discusses workovers and abandonments in more detail. Completed and producing wells may require periodic reentry that is designed to maintain or restore a desired flow rate. These procedures are referred to as a well "workover." Workover operations are also carried out to evaluate or reevaluate a geologic formation or reservoir (including recompletion to another stratum) or to permanently abandon a part or all of a well. Workovers on subsea completions require that a rig be moved on location to provide surface support. Workovers can take from 1 day to several months to complete depending on the complexity of the operations, with a median of 7 days. On the basis of historical data, MMS projects a producing well may expect to have seven workovers or other well activities during its lifetime.

There are two types of well abandonment operations—temporary and permanent. The operator must meet specific requirements to temporarily abandon a well (30 CFR 250.703).

Lessees are required to remove all seafloor obstructions from their leases within 1 year of lease termination or relinquishment. Decommissioning and removal operations are described in **Chapter 3.1.1.6**.

Tables 3-2 and 3-3 show the number of workovers and other well activities projected as a result of a proposed action. The projected number of workovers is a function of producing wells, including one permanent abandonment operation per well.

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

Petroleum hydrocarbons can enter the Gulf of Mexico from a wide variety of sources. The major sources of oil inputs in the Gulf of Mexico are natural seepage, produced waters, land-based discharges, and spills. These sources are discussed in detail in Chapter 4.1.3.4 of the Multisale EIS. Numerical estimates of the contribution of these sources to the Gulf of Mexico coastal and offshore waters are presented in Tables 4-11 and 4-12 of the Multisale EIS, respectively. The information presented in the Multisale EIS is based on *Oil in the Sea III: Inputs, Fates, and Effects* (NRC, 2003) and is summarized below.

Although the Gulf of Mexico comprises one of the world's most prolific offshore oil-producing provinces as well as having heavily traveled tanker routes, inputs of petroleum from onshore sources far outweigh the contribution from offshore activities. Man's use of petroleum hydrocarbons is generally concentrated in major municipal and industrial areas situated along coasts or large rivers that empty into coastal waters.

Natural Seepage

Natural seeps provide the largest petroleum input to the offshore Gulf of Mexico, about 95 percent of the total. Mitchell et al. (1999) estimated a range of 280,000-700,000 bbl per year (40,000-100,000 tonnes per year), with an average of 490,000 bbl (70,000 tonnes) for the northern Gulf of Mexico, excluding the Bay of Campeche. Using this estimate and assuming seep scales are proportional to surface area, the NRC (2003) estimated annual seepage for the entire Gulf of Mexico at about 980,000 bbl

(140,000 tonnes) per year. As seepage is a natural occurrence, the rate of about 980,000 bbl (140,000 tonnes) per year is expected to remain the same throughout the 40-year analysis period.

Produced Water

During OCS operations, small amounts of oil are routinely discharged in produced water, which is treated and discharged overboard according to USEPA regulations. The estimated average annual volume of 596 MMbbl per year of OCS-produced water would contribute 19,250 bbl (2,750 tonnes) of petroleum hydrocarbons to the Gulf of Mexico waters, or 2 percent to the total petroleum input but 11 percent of the anthropogenic petroleum hydrocarbons.

Land-based Discharges

Land-based sources provide the largest petroleum input to the coastal waters of the Gulf of Mexico. Land-based sources include residual petroleum hydrocarbons in municipal and industrial wastewater treatment facility discharges as well as urban runoff. The Mississippi River carries the majority of petroleum hydrocarbons into Gulf of Mexico waters from land-based drainage that occurs far upriver. With increased urbanization, particularly in coastal areas, the amount of impervious paved surface increases, and oil contaminants deposited on these roads and parking lot surfaces are washed into adjacent streams and waterbodies.

Spills

Oil spills occur during the production, transportation, and consumption of oil. The composition of spilled hydrocarbons includes crude oil, refined fuels such as diesel during transport and storage and spills during consumption. Chapter 4.1.3.4 of the Multisale EIS, which discusses offshore and coastal spills and spills related to and not related to OCS activity, is summarized below. **Chapter 3.2.1** of this SEIS discusses potential spills associated with a proposed action, specifically.

Naturally, spills will vary according to activities conducted in the area. Spills from pipelines are the largest spill source of oil to the coastal waters of the western Gulf of Mexico. Spills from tankers are the largest spill source to coastal waters of the eastern Gulf of Mexico. At the national level, tankers and tank barges were responsible for 82 percent of the total spillage. The type of oil spilled nationally was as follows: 36 percent crude oil; 36 percent heavy distillate (No. 6 fuel oil, bunker C); 25 percent light distillate (diesel, kerosene); and 3 percent gasoline.

Spills could happen because of an accident associated with future OCS operations. Table 4-13 of the Multisale EIS provides the estimated number of all spill events (OCS and non-OCS) that the MMS projects will occur within coastal and offshore waters of the Gulf of Mexico area for a representative future year (around 15 years after the proposed action). Table 4-13 of the Multisale EIS distinguishes spill occurrence risk by likely operation or source and the estimated size of spills. Table 4-13 of the Multisale EIS shows the estimated number of OCS spills yearly rather than for the 40-year program. Figures 4-8, 4-9, and 4-10 of the Multisale EIS show that there is a great deal of uncertainty as to the number of future OCS spills that will occur. If the low resource estimate is realized, about 39 possible spills ≥1,000 bbl could occur. For the high resource estimate, about 49 possible spills ≥1,000 bbl could occur.

Spills as the Result of Hurricanes

Chapter 4.1.3.4.4.2 of the Multisale EIS discusses the cause and volume of spills that resulted from the 2004-2005 hurricanes. Since the publication of the Multisale EIS, MMS has revised information and quantities of oil spillage resulting from damages caused by Hurricanes Katrina and Rita in 2005 (USDOI, MMS, 2007d). The following is a summary of the revisions.

As of July 2007, MMS has identified 154 spills of petroleum products of ≥1 bbl, totaling 17,077 bbl that were lost from platforms, rigs, and pipelines on the Federal OCS. This is up from MMS's January 2007 report that had identified 125 spills, totaling 16,302 bbl (USDOI, MMS, 2007e).

The July 2007 report also discussed spills of <1 bbl. Between October 2005 and June 2007, there were approximately 600 petroleum spills of <1 bbl on the Federal OCS related to the 2005 hurricanes reported to the National Response Center (NRC). These NRC reports totaled to <50 bbl and averaged approximately 3 gallons each in size. These spills of <1 bbl dissipate quickly due to evaporation, dispersion by the winds and currents, and dilution by the ocean waters. Three gallons of crude oil can briefly create a sheen of an acre (43,560 ft^2 or 4,047 m^2) or more in size on the ocean surface. These small releases generally do not cause identifiable environmental impacts out in the open ocean.

Unchanged from the earlier report, there were no accounts of environmental consequences resulting from spills from facilities:

- no spill contacts to the shoreline;
- no oiling of marine mammals, birds, or other wildlife;
- no large volumes of oil on the ocean surface to be collected or cleaned up; and
- no identified environmental impacts from any OCS spills from Hurricanes Katrina or Rita.

The final estimation of the total spillage associated with Hurricanes Katrina and Rita will not be complete until all operators have completed recovery efforts associated with the repair and/or have completed decommissioning of all the damaged structures. These activities are continuing in 2008.

Offshore Spills

The OCS-related offshore spills and non-OCS-related offshore spills are addressed in Chapters 4.1.3.4.4.4 and 4.1.3.4.4.5 of the Multisale, respectively. One OCS-related offshore spill of ≥1,000 bbl per year due to a pipeline release is anticipated. Besides spills occurring from facilities and during pipeline transport, as was the only case for a proposed action, offshore spills could occur due to OCS future operations from an FPSO or from shuttle tankers transporting OCS crude oil into ports. Table 4-13 of the Multisale EIS includes the likelihood of a spill from a shuttle-tanker accident carrying OCS-produced crude oil. The scenario with the highest risk of spill occurrence is the high-case resource estimate for the OCS Program in the CPA, which assumes some shuttle-tanker transport of OCS-produced oil. Under that scenario, there is a 63 percent chance that a spill ≥1,000 bbl and a 29 percent chance that a spill ≥10,000 bbl would occur from an OCS-related shuttle tanker during the 40-year analysis period. Offshore spill sizes were estimated based on historical records for a representative future year (Anderson and LaBelle, 2000).

Offshore OCS Program spills <1,000 bbl were estimated based on historical records collected from 1985 to 2001 and about 450-500 spills <1,000 bbl occurred from OCS offshore sources yearly. Less documentation is available for spills <1,000 bbl because they are more routine, they do not persist on the water as long, and they are likely to pose less of an environmental threat than larger spills. Additionally, many of the reported spills are of an unknown origin.

Non-OCS-related offshore spills ≥1,000 will occur from the extensive maritime barging and tankering operations that occur in offshore waters of the Gulf of Mexico. The analysis of spills from tankers and barges ≥1,000 bbl is based on data obtained from the USCG and analyzed by MMS. Less than one spill ≥1,000 bbl is projected to occur in the offshore Gulf of Mexico for a typical future year from the extensive tanker and barge operations (Table 4-13 of the Multisale EIS).

Coastal Spills

Table 4-13 of the Multisale EIS provides MMS's projections of the number of spills that will occur in the coastal waters of the Gulf of Mexico (State offshore and inland coastal waters) in a typical future year as a result of operations that support the OCS Program.

The OCS-related coastal spills and non-OCS-related coastal spills are addressed in Chapters 4.1.3.4.4.6 and 4.1.3.4.4.7 of the Multisale EIS, respectively. An OCS-related spill in coastal waters of ≥1,000 bbl and related to the proposed activity will occur less than once per year. Such a spill would only occur about once every 6 years. An OCS spill ≥1,000 bbl would likely be from a pipeline accident for OCS coastal spills ≥1,000 bbl, and a spill size of 4,200 bbl is assumed. Smaller spills occur more regularly, and roughly 40-50 OCS-related spills in coastal waters of <1,000 bbl related to the future OCS Program proposed activity on the OCS are estimated to occur per year. It is assumed that the spill risk would be widely distributed in the coastal zone, but primarily within the Houston/Galveston area of Texas and the deltaic area of Louisiana. Based on an MMS analysis of USCG data on all U.S. coastal spills by volume, 42 percent of the spills will occur in State offshore waters, 1.5 percent will occur in Federal offshore waters, and 57 percent will occur in inland waters. It is assumed all coastal spills will contact land and proximate resources. For OCS-related coastal spills <1,000 bbl, a spill size of 5 bbl is assumed.

Non-OCS-related coastal spills primarily occur from vessel accidents. Other sources include spills during the pipeline transport of petroleum products; crude oil; State oil and gas facilities; petrochemical refinery accidents; and from storage tanks at terminals. A non-OCS-related coastal spill ≥1,000 bbl occurred roughly once every 2 years in the 1985-2001 USCG records. This is a very rough estimate due to the infrequent occurrence of a spill of this size in coastal waters. Non-OCS-related coastal spills <1,000 bbl occurred annually at a rate of 400-600 per year in the 1996-2001 USCG data. Many of the reported spills are from an unknown source. Based on an MMS analysis of U.S. spill data maintained by the USCG (USDOT, Coast Guard, 2007), the historical percentages of coastal spill occurrences in different waterbody types were calculated to be as follows: 47 percent have occurred in rivers and canals; 19 percent in bays and sounds; and 34 percent in harbors.

3.1.1.4. Offshore Transport

The following sections discuss the five likely methods to be used to transport production, supplies, and personnel as a result of a CPA or WPA proposed action.

3.1.1.4.1. Pipelines

A mature pipeline network exists in the Gulf of Mexico to transport oil and gas production from the OCS to shore. The OCS-related pipelines nearshore and onshore may merge with pipelines carrying materials produced in State territories for transport to processing facilities or to connections with pipelines located farther inland. At present, all gas production and >99 percent of oil production from offshore Gulf of Mexico is transported to shore by pipeline. A small amount (<1%) of oil production is barged in shallow water (<60 m or <200 ft). Chapter 4.1.1.8.1 of the Multisale EIS describes in detail a description of the existing pipeline network in the Gulf of Mexico, installation trends, installation methods, pipeline burial, and issues related to deep water. The following is a summary of that information.

The MMS's minimum cathodic protection design criteria for pipeline external corrosion protection is 20 years. For the most part, pipelines have a designed life span greater than 20 years and, if needed, can be retrofitted to increase the life span. As for internal corrosion mitigation, companies are required to monitor products transported through the pipelines for corrosiveness. Based on the type of production, a company then mitigates the pipeline internal corrosion protection by injecting appropriate corrosion inhibitors and monitoring its effectiveness to prevent pipeline failures, thus extending the life of a pipeline. It should be noted that different products have different corrosive characteristics.

Should a pipeline need to be replaced because of integrity issues, a replacement pipeline is installed or alternate routes are used to transport the products, or a combination of the two. Besides replacement because of integrity issues, a pipeline may also be required to be replaced as result of storm or other damages. It is estimated that the overall pipeline replacement over the past few years is about 1 percent of the total installed.

Alternative transportation methods of natural gas discussed in Chapter 4.1.1.8.6 of the Multisale EIS involve transporting natural gas as LNG or compressed natural gas (CNG). However, it is reasonably foreseeable that gas production will continue to be transported by pipeline.

Pipeline Landfalls

It is expected that pipelines from most of the new offshore production facilities will connect to the existing pipeline infrastructure, which will result in few new pipeline landfalls. Production from a CPA and WPA proposed action will contribute to existing and future pipelines and pipeline landfalls. Projections of new landfalls are discussed in **Chapter 3.1.2.3**.

Pipeline Burial

According to MMS regulations (30 CFR 250.1003(a)(1)), pipelines with diameters $\geq 8^5/_8$ inches (22 cm) that are installed in water depths <60 m (200 ft) are to be buried to a depth of at least 3 ft below the mudline. The regulations also provide for the burial of any pipeline, regardless of size, if MMS determines that the pipeline may constitute a hazard to other uses of the OCS; in the Gulf of Mexico, MMS has determined that all pipelines installed in water depths <60 m (200 ft) must be buried. The purpose of these requirements is to reduce the movement of pipelines by high currents and storms, to protect the pipeline from the external damage that could result from anchors and fishing gear, to reduce the risk of fishing gear becoming snagged, and to minimize interference with the operations of other users of the OCS.

Where pipeline burial is necessary, a jetting sled will be used. Jetting disperses sediments over the otherwise undisturbed water bottom that flanks the jetted trench. The area covered by settled sediment and the thickness of the settled sediment depends upon variations in bottom topography, sediment density, and currents. Sediment displacement due to pipeline burial is further explained in Chapter 4.1.1.3.2.2 of the Multisale EIS.

Deep Water

Newer installation methods have allowed the pipeline infrastructure to extend farther into deep water. At present, the deepest pipeline in the Gulf is in 2,700 m (8,858 ft) water depth. More than 500 pipelines reach water depths of 400 m (1,312 ft) or more, and over 400 of those reach water depths of 800 m (2,625 ft) or more.

New pipelines installed in and near the 181 South Area would encounter the same technical challenges as other deepwater areas. These technical challenges are described in more detail in the Multisale EIS and *Deepwater Gulf of Mexico 2006: America's Expanding Frontier* (USDOI, MMS, 2006b).

Figure 3-2 shows the location of active pipelines near the 181 South Area. The nearest existing pipeline is located a little over 40 mi (64 km) from the 181 South Area.

Production from the 181 South Area would likely begin 8 or more years after a lease sale. By that time it is anticipated that existing pipelines will have adequate capacity to transport gas production from the 181 South Area. If needed, capacity could be increased by adding compressors.

The Draft SEIS stated "oil discovered in the 181 South Area will likely be heavier oil than most other areas of the CPA and WPA." However, additional data and analysis following publication of the Draft SEIS show that the quality of oil that may be discovered in the 181 South Area will likely be similar to that of oils discovered in other deepwater areas of the CPA. However, if heavy oils are discovered, it may not be transported to market via pipelines. Companies would most likely seek other alternatives (i.e., FPSO's). Due to the lack of existing pipelines in the vicinity of the 181 South Area, initial oil production would most likely be transported to market via FPSO's. The construction of new pipelines within the 181 South Area would depend on the location of production structures and the amount of production, but the structures would likely still connect to existing pipeline systems and would not result in new pipeline landfalls.

Review and Approval Process

Applications for pipeline decommissioning must also be submitted for MMS review and approval. Decommissioning applications are evaluated to ensure they will render the pipeline inert, to minimize the potential for the pipeline becoming a source of pollution by flushing and plugging the ends, and to minimize the likelihood that the decommissioned line will become an obstruction to other users of the OCS by filling it with water and burying the ends.

The MMS's review of pipeline applications includes the evaluation of protective safety devices such as pressure sensors and automatic valves, and the physical arrangement of those devices proposed to be installed by the applicant. The purpose of the safety devices is to protect the pipeline from possible overpressure conditions and for detecting and initiating a response to abnormally low-pressure conditions. Once a pipeline is installed, operators conduct monthly overflights to inspect pipeline routes for leakage. Chapter 1.5, Postlease Activities (Pollution Prevention), of the Multisale EIS discusses this topic in depth.

Scenario

There are 130-1,700 km (81-1,056 mi) of new pipelines projected as a result of a CPA proposed action (**Table 3-2**) and 130-760 km (8-472 mi) as a result of a WPA proposed action (**Table 3-3**). For CPA and WPA proposed actions, about half of the new pipeline length would be in water depths <60 m (197 ft) requiring burial. There are 0-1 new landfalls for a CPA proposed action and 0-1 for a WPA proposed action.

The length of new pipelines was estimated using the amount of production, the number of structures projected as a result of the proposed actions, and the location of the existing pipelines. The range in length of pipelines projected is because of the uncertainty of the location of new structures and which existing or proposed pipelines would be utilized. Many factors would affect the actual transport system, including company affiliations, amount of production, product type, and system capacity.

3.1.1.4.2. Barges

Barges may be used offshore to transport oil and gas, supplies such as chemicals or drilling mud, or wastes between shore bases and offshore platforms in shallow waters (<60 m or <200 ft) of the Gulf of Mexico. It is assumed that barging will continue to account for <1 percent of the oil transported for the entire OCS Program and the CPA and WPA proposed actions. Due to the distance offshore, no barging of production from the 181 South Area is anticipated. Detail discussions of barges and barging can be found in Chapters 4.1.1.8.2 and 3.3.5.8.6.2 of the Multisale EIS, respectively.

3.1.1.4.3. Oil Tankers

Chapter 4.1.1.8.3 of the Multisale EIS discusses in detail the use of FPSO's and shuttle tankers for the transportation of OCS oil production. Shuttle tanker transport of Gulf of Mexico OCS-produced oil has not occurred to date. Tankering is projected for some future OCS operations located in deepwater beyond the existing pipeline network. The FPSO's store crude oil in tanks located in the hull of the vessel and periodically offload the crude to shuttle tankers or ocean-going barges for transport to shore. The FPSO's may be used to develop marginal oil fields or used in areas remote from the existing OCS pipeline infrastructure. **Tables 3-2 and 3-3** show that, as a result of a proposed action, the use of FPSO's and shuttle tankering are projected in water depths >800 m (2,625 ft).

Shuttle tankers would be used to transport crude oil from FPSO production systems to Gulf Coast refinery ports or to offshore deepwater ports such as the Louisiana Offshore Oil Port (LOOP). The shuttle tanker design and systems would be in compliance with USCG regulations. Under the Jones Act and OPA 90 requirements, shuttle tankers would be required to be double hulled. Shuttle tankers are likely to be 500,000-550,000 bbl in cargo capacity.

Safety features, such as marine break-away offloading hoses and emergency shut-off valves, would be incorporated in order to minimize the potential for, and size of, an oil spill. In addition, weather and sea-state limitations would be established to further ensure that hook-up and disconnect operations will not lead to accidental oil release. A vapor recovery system between the FPSO and shuttle tanker will be employed to minimize release of fugitive emissions from cargo tanks during offloading operations.

The Draft SEIS stated "oil discovered in the 181 South Area will likely be heavier oil than most other areas of the CPA and WPA." However, additional data and analysis following publication of the Draft SEIS show that the quality of oil that may be discovered in the 181 South Area will likely be similar to that of oils discovered in other deepwater areas of the CPA. However, if heavy oils are discovered, it may not be transported to market via pipelines. Companies would most likely seek other alternatives (i.e., FPSO's). Because of the lack of existing pipelines in the vicinity of the 181 South Area, initial production would most likely be transported to market via FPSO's. The construction of new pipelines within the 181 South Area would depend on the location of production structures and the amount of production, but the structures would likely still connect to existing pipeline systems and would not result in new pipeline landfalls.

The number of shuttle-tanker trips to port in a given year is primarily a function of the FPSO production rate and the capacity of supporting shuttle tankers. Considering an FPSO operating at a peak production rate of 150,000 bbl/day, supported by shuttle tankers of 500,000-bbl capacity, offloading would occur once every 3.3 days. This would equate to a 54.75-MMbbl production with 110 offloading events and shuttle tanker transits to Gulf coastal or offshore ports annually per FPSO.

3.1.1.4.4. Service Vessels

Service vessels are one of the primary modes of transporting personnel between service bases and offshore platforms, drilling rigs, derrick barges, and pipeline construction barges. In addition to offshore personnel, service vessels carry cargo (i.e., freshwater, fuel, cement, barite, liquid drilling fluids, tubulars, equipment, and food) offshore. A trip is considered the transportation from a service base to an offshore site and back, in other words a round trip. Based on MMS calculations, each vessel makes an average of eight round trips per week for 42 days in support of drilling an exploration well and six round trips per week for 45 days in support of drilling a development well. A platform in shallow water (<400 m or 1,312 ft) is estimated to require one vessel trip every 10 days over its 25-year production life. A platform in deep water (>400 m or 1,312 ft) is estimated to require one vessel trip every 1.75 days over its 25-year production life. All trips are assumed to originate from the service base.

Service-vessel trips projected for a CPA proposed action are 119,000-241,000 trips (**Table 3-2**). This equates to an average annual rate of 2,975-6,025 trips. This includes an additional 2,000-7,000 service-vessel trips or 50-175 trips annually that are projected from the addition of the 181 South Area. A WPA proposed action is estimated to generate 94,000-155,000 service-vessel trips or 2,350-3,875 trips annually (**Table 3-3**).

Table 3-36 of the Multisale EIS shows over 1 million trips occurred on OCS-related waterways in 2004. The number of service-vessel trips projected annually for a CPA or WPA proposed action would represent <1 percent of the total annual traffic on these OCS-related waterways.

3.1.1.4.5. Helicopters

Helicopters are one of the primary modes of transporting personnel between service bases and offshore platforms, drilling rigs, derrick barges, and pipeline construction barges. Helicopters are routinely used for normal crew changes and at other times to transport management and special service personnel to offshore exploration and production sites. In addition, equipment and supplies are sometimes transported by helicopter. Chapters 3.3.5.7.2.4 and 4.1.1.8.5 of the Multisale EIS discuss in detail the use of helicopter to support offshore oil and gas activities.

The Federal Aviation Administration (FAA) regulates helicopter flight patterns. Because of noise concerns, FAA Circular 91-36C encourages pilots to maintain higher than minimum altitudes near noise-sensitive areas. Corporate policy (for all helicopter companies) states that helicopters should maintain a minimum altitude of 700 ft (213 m) while in transit offshore and 500 ft (152 m) while working between platforms and drilling rigs. When flying over land, the specified minimum altitude is 1,000 ft (305 m) over unpopulated areas and coastlines, and 2,000 ft (610 m) over populated areas and sensitive areas including national parks, recreational seashores, and wildlife refuges. In addition, guidelines and regulations issued by NMFS under the authority of the Marine Mammal Protection Act include provisions specifying helicopter pilots to maintain an altitude of 1,000 ft (305 m) within 100 yd (91 m) of marine mammals.

According to the Helicopter Safety Advisory Conference (2008), from 1996 to 2006, helicopter operations (take offs and landings) in support of Gulfwide OCS operations have averaged, annually, about 1.4 million operations, 3.0 million passengers, and 400,000 flight hours. There has been a decline in helicopter operations from 1,668,401 in 1996 to 1,246,172 in 2006 (Helicopter Safety Advisory Conference, 2008).

The proposed action and OCS Program scenarios below use the current level of activity as a basis for projecting future helicopter operations. A CPA proposed action s projected to generate 1,004,000-2,241,000 helicopter operations or 25,100-55,025 operations annually (**Table 3-2**). This includes an additional 4,000-41,000 helicopter operations or 100-1,025 operations annually that are projected from the addition of the 181 South Area. Helicopter operations projected for a WPA proposed action are 400,000-900,000 operations (**Table 3-3**). This equates to an average annual rate of 10,000-22,500 operations.

3.1.1.5. Safety Issues

3.1.1.5.1. Hydrogen Sulfide and Sulfurous Petroleum

Chapter 4.1.1.9 of the Multisale EIS of describes in detail sulfur that may be present in oil as elemental sulfur, within hydrogen sulfide (H_2S) gas, or within organic molecules, all three of which vary in concentration independently. Safety and infrastructure concerns include the following: irritation, injury and lethality from leaks; outgassing from spilled oil and exposure to sulfur oxides produced by flaring; equipment and pipeline corrosion; and synergistic amplification of oil-spill impacts from outgassing.

Sour oil and gas occur sporadically throughout the Gulf of Mexico OCS, primarily off the Louisiana, Mississippi, and Alabama coasts. Occurrences of H_2S offshore Texas are in Miocene rocks and occur principally within a geographically narrow band. The next highest concentrations of H_2S have been in the range of 20,000-55,000 parts per million (ppm) in some natural gas wells offshore Mississippi/Alabama. There is some evidence that petroleum from deepwater areas may be sulfurous, but there is no evidence that it is contains appreciable amounts of H_2S. Data from petroleum wells drilled near the 181 South Area have confirmed this assumption. Deep gas reservoirs on the Gulf of Mexico continental shelf are likely to have high corrosive content, including H_2S.

The MMS reviews all proposed actions in the Gulf of Mexico OCS for the possible presence of H_2S. Activities found to be associated with a presence of H_2S are subjected to further review and requirements. Federal regulations at 30 CFR 250 require all lessees, prior to beginning exploration or development operations, to request a classification of the potential for encountering H_2S. The classification is based on previous drilling and production experience in the areas surrounding the proposed operations, as well as other factors. All operators on the OCS involved in production of sour gas or oil (i.e., >20 ppm) are also required to file an H_2S contingency plan. This plan delimits procedures to ensure the safety of the workers on the production facility. In addition, all operators are required to adhere to the National Association of Corrosion Engineers' (NACE) *Standard Material Requirement MR.01-75-96 for Sulfide Stress Cracking Resistant Metallic Materials for Oilfield Equipment* (NACE, 1990). These engineering standards serve to enhance the integrity of the infrastructure used to produce the sour oil and gas, and further serve to ensure safe operations. The MMS has issued a final rule governing requirements for preventing hydrogen sulfide releases, detecting and monitoring hydrogen sulfide and sulfur dioxide, protecting personnel, providing warning systems, and establishing requirements for hydrogen sulfide flaring. The rule went into effect on March 28, 1997. An associated NTL (98-16) titled "Hydrogen Sulfide (H_2S) Requirements" was issued on August 10, 1998, to provide clarification, guidance, and information on the revised requirements. The NTL provides guidance on sensor location, sensor calibration, respirator breathing time, measures for protection against sulfur dioxide, requirements for classifying an area for the presence of H_2S, requirements for flaring and venting of gas containing H_2S, and other issues pertaining to H_2S-related operations.

3.1.1.5.2. Shallow Waterflows

Since 1987, operators have reported to MMS shallow waterflow events, which are a phenomenon encountered in water depths exceeding 600 ft (183 m). Reported waterflows are between a few hundred feet to more than 4,000 ft (1,219 m) below the seafloor. Water flowing around the annulus will deposit sand or silt on the seafloor within a few hundred feet of the wellhead. Although in most cases there is no gas content in the waterflow, in these water depths a stream of gas bubbles will form frozen gas hydrates on flat surfaces of seafloor drilling equipment.

3.1.1.5.3. Damage to Offshore Infrastructure as the Result of Hurricanes

During the past few years, the Gulf Coast States and Gulf of Mexico oil and gas activities have been impacted by several major hurricanes. Chapter 3.3.5.7.3 of the Multisale EIS summarized the latest reports by MMS on the damage to the OCS-related platforms, rigs, and pipelines caused by Hurricanes Ivan, Katrina, and Rita. **Chapter 3.1.1.3** of this SEIS provides an update on the cause and volume spills that resulted from recent hurricanes.

In preparation for the 2007 hurricane season, MMS announced operational and administrative improvements that have been implemented to prepare oil and gas infrastructure in the Gulf of Mexico for the possibility of hurricanes during the 2007 season. Both MMS and industry had to reassess what possible weather conditions could occur with a major hurricane moving through the Gulf of Mexico. The reassessment was done through American Petroleum Institute (API) committees, in which MMS was an active participant. The committees revised and updated the best practices and standards using the new information that had been collected following the 2005 hurricanes. In 2008, API issued a number of bulletins to help better prepare for Gulf hurricanes:

- Bulletin 2TD, "Guidelines for Tie-downs on Offshore Production Facilities for Hurricane Season," is aimed at better-securing separate platform equipment.
- Bulletin 2INT-MET, "Interim Guidance on Hurricane Conditions in the Gulf of Mexico," provides updated metocean data for four regions of the Gulf, including wind velocities, deepwater wave conditions, ocean current information, and surge and tidal data.
- Bulletin 2INT-DG, "Interim Guidance for Design of Offshore Structures for Hurricane Conditions," covers how to apply the updated metocean data during design.
- Bulletin 2INT-EX, "Interim Guidance for Assessment of Existing Offshore Structures for Hurricane Conditions," assists owners/operators and engineers with existing facilities.

These API bulletins contain engineering design principles and good practices for new platforms and assessments of existing platforms by imposing more stringent design and assessment criteria for both new and existing structures in the Gulf of Mexico. The new criteria will increase survivability during hurricane conditions and will result in fewer damaged platforms.

Notices to Lessees and Operators

Between February 28, 2008, and July 9, 2008, MMS issued 16 new NTL's. Four of the NTL's specifically addressed the 2008 hurricane season and one (NTL 2008-N02) announced to newer lessees and operators MMS's commitment to conduct an Annual Performance Review.

- NTL 2008-N02 (superseded NTL 1997-3N; "Outer Continental shelf (OCS) Inspection Program") notifies newer lessees and operators of Federal oil, gas, and sulphur leases on the OCS that MMS is committed to conducting an Annual Performance Review of each operator as well as what area(s) or criteria to be evaluated.
- NTL 2008-G08 (superseded NTL 2007-G16; "Hurricane and Tropical Storm Effects Reports") provides guidance on using either e-mail or eWell Permitting and Report Systems to report hurricane and tropical storms effects information, specifies the information to be included in the various hurricane and tropical storm reports, updates contacts information, and makes minor administrative amendments.
- NTL 2008-G09 ("Guidelines for Moored Drilling Rig Fitness Requirements for Hurricane Season") provides guidance for information required to be submitted with an application for permit to drill (APD) or modify (APM) to demonstrate the fitness of any moored drilling rig used to conduct operations in the Gulf of Mexico during hurricane season.
- NTL 2008-G10 ("Guidelines for Jack-up Drilling Rig Fitness Requirements for Hurricane Season") provides guidance for information required to be submitted with

an APD or APM, to demonstrate the fitness of any jack-up rig used to conduct operations in the GOM during hurricane season.

- NTL 2008-G11 ("Interim Guidelines for Tie-downs on OCS Production Platforms for the 2008 Hurricane Season") provides guidance on the evaluation of tie-downs that will be used on OCS production platforms to secure drilling and workover rigs and permanent equipment and facilities during the 2008 hurricane season.

Several NTL's were specifically issued for the 2006 and 2007 hurricane seasons; NTL 2007-G27 ("Assessment of Existing OCS Platforms and Related Structures for Hurricane Conditions") and NTL 2007-G26 ("Design of New OCS Platforms and Related Structures for Hurricane Conditions") were issued to ensure that the assessment of existing and the design of new OCS platforms and related structures consider the specific environmental conditions, including hurricane metocean conditions, at the platform location as required by 30 CFR 250.900(a).

Evacuation Plans

The development of evacuation plans for OCS facilities is the responsibility of the operator. The OCS operators develop detailed evacuation plans that encompass evacuation procedures that go beyond just getting the personnel to shore; they also take measures to ensure that personnel associated with onshore infrastructure are out of harm's way prior to storm landfall.

Hurricane-Induced Mudslides

Near-bottom orbital velocities of waves generated by hurricanes can induce substantial changes in sediment engineering properties that result in increased magnitude of sediment motion and shear strain. These effects, along with sediment accumulation due to river runoff, can cause bottom instabilities (Teague et al., 2006). These bottom instabilities could result in mudslides.

The area in the Gulf of Mexico most susceptible to underwater mudslides is located in the CPA, within about 25 mi (40 km) of the Mississippi Delta. In most parts of the Mississippi Delta region, mudslides are generally caused by very large storms and are therefore infrequent events. Only three major storms (Hurricanes Camille, Ivan, and Katrina) caused significant and widespread mudslide activity in the past 40 years. The majority of pipelines damaged by mudslides occurred during Hurricane Ivan in 2004. Two platforms have been destroyed by mudslides in the Gulf of Mexico, one during Hurricane Camille in 1962 and the other during Hurricane Ivan in 2004.

Two recent, MMS-funded studies examined wave-induced submarine mudslides in the Mississippi Delta region caused by these major hurricanes, and included the development of a model that can be used to analyze and predict these mudslides (Nodine et al., 2006 and 2007). Findings of these studies are presented below.

Wave period was found to be an important factor in mudslide vulnerability. Hurricane Ivan produced relatively long wave periods compared with previous large hurricanes, which may have aggravated the impact and caused mudslides in deeper water than a typical hurricane would have. Slope angle was not found to be a significant factor in mudslide vulnerability except in the deeper parts of the mudslide prone area (>300 ft or >91 m).

The study found that the simple, limit equilibrium model developed works well to predict the factor of safety against mudslide initiation for a given location, and is well-suited to quantify the effects of wave height and period, water depth, slope angle, and profile of undrained shear strength versus depth for potential mudslides. However, site-specific analyses of mudslide vulnerability are challenging due to substantial variations in soil shear strength over short distances.

Mudslides are localized features, on the order of several thousand feet or meters in lateral extent and are about 50-150 ft (15-46 m) deep. During Hurricane Ivan, waves and strong near-bottom currents impacted bottom sediments on the outer shelf at water depths as deep as 90 m (295 ft) (Teague et al., 2007). The areal extent and depth of mudslides are related to the lengths and widths of the storm waves that cause them. Mudslides are not likely to lead to large-scale, regional mudflows due to the very flat slopes in the mudslide prone area and the large amount of local variation in soil shear strength.

The return periods for mudslides impacting facilities range from less than 10 years to greater than 1,000 years and depend strongly on location. The risk for mudslides occurring and impacting facilities increases as the water depth decreases, the slope of the bottom increases, and the amount of infrastructure in a particular area increases.

Future pipeline damage and platform losses could occur due to mudslides during major hurricanes. The MMS and industry have made efforts to mitigate risks to offshore infrastructure.

Larger diameter pipelines and those perpendicular to the direction of mudslide direction would be more susceptible to damage (Zone, 2006). The MMS considers these factors when reviewing pipeline plans in the mudslide area. The MMS's general policy is to recommend alternative routes that would decrease the surface area that would be encountered by a mudslide. In addition, the mudslide area is located in shallow water (<60 m or <200 ft), and under MMS regulations (30 CFR 250.1003(a)(1)), pipelines with diameters $\geq 8^5/_8$ inches (22 cm) that are installed in water depths <60 m (200 ft) are to be buried to a depth of at least 3 ft (1 m) below the mudline.

All OCS platforms are subject to regulations contained in 30 CFR 250.900-921, Subpart I, Platforms and Structures. Under 30 CFR 250.906(c), depending on the design and location of a structure, MMS may require an operator to perform a subsurface survey and testing, including investigating the stratigraphic and engineering properties of the soil that may affect the foundations or anchoring systems for the facility. The MMS regulations at 30 CFR 250.901(a)(4) require that all OCS platforms be designed, fabricated, and installed in accordance with the provisions of the API Recommended Practice for Planning, Designing, and Constructing Fixed Offshore Platforms—Working Stress Design, Twenty-First Edition, December 2000 (API RP 2A-WSD; API, 2000). To reinforce structures in the mudslide area, wells are routinely drilled and completed through the legs of platforms, and the annular space around the conductors is filled with grout.

Federal regulations at 30 CFR 250.1700, Subpart Q, Decommissioning Activities, require that an offshore oil and gas lease be cleared of all structures within 1 year after production on the lease ceases, or when the facility is no longer useful. The MMS also has the authority to order operators to permanently plug a well if that well poses a hazard to the environment. At the end of 2003, there were 1,227 idle (non-producing) structures in the Gulf of Mexico (Kaiser and Pulsipher, 2007). These idle structures pose a potential hazard to other structures in the event of a hurricane or mudslide. In recent years, MMS has begun to encourage operators to remove structures on producing leases that are no longer "economically viable." On August 1, 2007, MMS issued Safety Alert No. 253, Plug and Abandonment of Non-producing Wells and Facilities, which alerts operators to this potential problem.

3.1.1.5.4. New and Unusual Technologies

Operators must identify new or unusual technology in exploration and development plans. These technologies are reviewed by MMS for alternative compliance or departures that may trigger additional environmental review. Chapter 4.1.1.10 of the Multisale EIS discusses in detail the environmental and engineering safety review processes for new and unusual technology. No additional new or unusual technology has been identified for the 181 South Area.

3.1.1.6. Decommissioning and Removal Operations

In compliance with Section 22 of MMS's Oil and Gas Lease Form (MMS-2005) and OCSLA regulations (30 CFR 250.1710—wellheads/casings and 30 CFR 250.1725—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. A detailed discussion of decommissioning and removal operations can be found in Chapter 4.1.1.11 of the Multisale EIS. The following is a summary of that information.

Programmatic Environmental Assessment

The MMS prepared a programmatic environmental assessment (PEA), *Structure-Removal Operations on the GOM Outer Continental Shelf* (USDOI, MMS, 2005), to evaluate the full range of potential environmental impacts of structure-removal activities in all water depths in the CPA and WPA and in the Sale 181/189 area in the EPA of the Gulf of Mexico. The activities analyzed in the PEA include vessel and equipment mobilization, structure preparation, nonexplosive- and explosive-severance activities, post-severance lifting and salvage, and site-clearance verification. The impact-producing factors of structure removals considered in the PEA include seafloor disturbances, air emissions and water discharges, pressure and acoustic energy from explosive detonations, and space-use conflicts with other OCS users. No potentially significant impacts were identified for air and water quality; marine mammals and sea turtles; fish, benthic, and archaeological resources; or other OCS pipeline, navigation, and military uses. On the basis of this PEA, MMS determined that an EIS was not required and prepared a Finding of No Significant Impact (FONSI).

On February 28, 2005, MMS submitted the new structure-removal PEA and a petition for new Incidental-Take Regulations under the MMPA to NMFS. After review of the petition and PEA, NMFS published a Notice of Receipt of MMS's Petition in the *Federal Register* on August 24, 2005. Only one comment was received by NMFS during the public comment period. On April 7, 2006, NMFS published the Proposed MMPA Rule for the Incidental Take of marine mammals in the *Federal Register* and the subsequent public comment period ended May 22, 2006 In addition, NMFS is also conducting a Section 7 ESA Consultation on their MMPA rulemaking efforts. The consultation was completed and MMS received a new Biological Opinion (BO) and Incidental Take Statement (ITS) on August 28, 2006, that superseded the previous "generic" and "de-minimus" BO's/ITS's. On June 19, 2008, NMFS finalized their MMPA rulemaking efforts and published the Final Rule for take-regulations for explosive severance, which are located in Subpart S of the MMPA regulations at 50 CFR 216.211-219.

Explosive and Nonexplosive Removals

A varied assortment of severing devices and methodologies has been designed to cut structural targets during the course of decommissioning activities. These devices are generally grouped and classified as either nonexplosive or explosive. Which severing tool the operators and contractors use takes into consideration the target size and type, water depth, economics, environmental concerns, tool availability, and weather conditions.

Tables 3-2 and 3-3 show platform removals by water-depth subarea as a result of the proposed actions. Of the 24-35 production structures estimated to be removed as a result of a CPA proposed action, 14-16 production structures (installed landward of the 800-m or 2,625-m isobath) are likely to be removed using explosives. Of the 20-31 production structures estimated to be removed as a result of a WPA proposed action, 11-17 production structures (installed landward of the 800-m or 2,625-m isobath) are likely to be removed using explosives. It is anticipated that multiple appurtenances will not be removed from the seafloor if placed in waters exceeding 800 m (2,625 ft).

No explosive removals are projected in water depths >800 m (2,625 ft), including the 181 South Area, because OCS regulations would offer the lessees in those water depths the option to avoid any severance/removal work by requesting alternate removal depths for well abandonments (30 CFR 250.1716(b)(3)) and facilities (30 CFR 250.1728(b)(3)). Above mudline cuts would be allowed with reporting requirements on the remnant's description and height off of the seafloor to MMS—data necessary for subsequent reporting to the U.S. Navy. In most cases, industry has indicated that it would use the alternate removal depth options, coupled with quick-disconnect equipment (i.e., detachable risers, mooring disconnect systems, etc.) to fully abandon in-place wellheads, casings, and other minor, subsea equipment in deep water without the need for any severing devices.

Removal of Bottom Debris

After bottom-founded objects are severed and the structures are removed, operators are required to verify that the site is clear of any obstructions that may conflict with other uses of the OCS. The MMS NTL 98-26, "Minimum Interim Requirements for Site Clearance (and Verification) of Abandoned Oil and Gas Structures in the GOM," provides the requirements for site clearance. The lessee must develop, and submit to the MMS for approval, a procedural plan for the site clearance verification procedures. For platform and caisson locations in water depths of less than 91 m (300 ft), the sites must be trawled over 100 percent of the designated area in two directions (i.e., N-S and E-W). Individual well-site clearances may use high-frequency (500 kHz) sonar searches for verification. Site-clearance verification must take place within 60 days after structure removal operations have been conducted.

Chapter 4.1.1.3.3.4 of the Multisale EIS discusses bottom debris, which is defined as material resting on the seabed (such as cable, tools, pipe, drums, anchors, and structural parts of platforms, as well as objects made of plastic, aluminum, wood, etc.) that are accidentally lost (e.g., during hurricanes) or tossed overboard from fixed or floating facilities. The maximum quantity of bottom debris per operation is estimated to be several tons. The MMS requires site clearance over the assumed areal extent over which debris will fall. It is assumed that most of the future lost debris will be removed from the seafloor during the structure decommissioning, site clearance, and verification process.

3.1.2. Coastal Impact-Producing Factors and Scenario

Over the years, a network of onshore support facilities, ports, roads, pipelines, and processing facilities have arisen to support offshore production. The primary coastal infrastructure and associated activities that could potentially affect the biological, physical, and socioeconomic resources of the Gulf of Mexico are

- service bases;
- helicopter hubs;
- construction facilities (i.e., platform fabrication yards, shipyards, and pipecoating facilities and yards);
- processing facilities (i.e., refineries and gas processing plants);
- terminals (i.e., pipeline shore facilities, barge terminals, and tanker port areas);
- disposal and storage facilities for offshore operations (i.e., nonhazardous oil-field waste sites and landfills); and
- transportation (i.e., coastal pipelines, coastal barging, and navigation channels).

Chapter 3.3.5.8 of the Multisale EIS describes the existing OCS-related coastal infrastructure and activities. Chapter 4.1.2.1 of the Multisale EIS describes the potential need for the construction of new facilities and the use of existing ones, including facility expansions, that could result from a proposed lease sale and the OCS Program. Up to one new pipeline landfall and up to one new gas processing plant were projected as a result of an individual proposed lease sale. The MMS projected no other new coastal infrastructure as a result of an individual proposed lease sale. A CPA or WPA proposed action may contribute to the use of existing and projected facilities. Projected new coastal infrastructure as a result of the OCS Program is shown by State in Table 4-9 of the Multisale EIS.

Much of the information on coastal infrastructure and activities presented in the Multisale EIS is from the MMS study, *OCS-Related Infrastructure in the Gulf of Mexico Fact Book* (Louis Berger Group, Inc., 2004). An update of the fact book is currently in progress (Dismukes, personal communication, 2007). In addition, MMS recently analyzed historical data and validated past scenario projections of new pipeline landfalls and new onshore waste disposal sites (USDOI, MMS, 2007f; Dismukes, personal communication, 2007). To date, no new information has been found that necessitates a change to the coastal infrastructure scenario presented in the Multisale EIS for either a proposed action or the OCS Program. A relatively minor amount of additional support activity is projected as a result of the addition of the 181 South Area; therefore, the coastal infrastructure scenario is still representative of likely future activity from a CPA proposed action.

The MMS is not a permitting agency of onshore infrastructure. The permitting agencies would be the U.S. Army Corps of Engineers (COE) and the State in which the activity has or would occur.

The following coastal infrastructure types are highlighted for discussion because there is either new general information available, new facilities projected to be constructed as a result of a proposed action, or new information relevant to discussions of the 181 South Area.

3.1.2.1. Service Bases

A service base is a community of businesses that load, store, and supply equipment, supplies, and personnel that are needed at offshore work sites. Chapters 3.3.5.8.1 and 4.1.2.1.1 of the Multisale EIS present a detailed description of OCS-related service bases. While a proposed action is not projected to significantly change existing OCS-related service bases or require any additional service bases, it would contribute to the use of existing service bases. **Figure 3-3** shows the 50 service bases the industry currently uses to service the OCS. These facilities were identified as the primary service base from plans received by MMS. The ports of Fourchon, Cameron, Venice, and Morgan City, Louisiana, are the primary service bases for Gulf of Mexico mobile rigs. Major platform service bases are Galveston, Freeport, and Port O'Connor, Texas; Cameron, Fourchon, Intracoastal City, Morgan City, and Venice, Louisiana; Pascagoula, Mississippi; and Theodore, Alabama.

Exploration and development plans received by MMS identify primary and secondary service bases for three types of support: supply vessel, crewboat, and helicopter. Supply vessels would be used to transport pipe and bulk supplies, and the supply vessel base would be the loading point and provide temporary storage. Crewboats would transport personnel and small supplies. Helicopters would be used to transport personnel and small supplies. Service bases can support one or more of these activities. An offshore facility could utilize one service base for all three uses or different service bases for different uses. In the event of changes in weather or operation conditions, a small amount of vessel and helicopter traffic may be dispatched from other bases. However, it is expected this will only be on a temporary basis and that vessel traffic and helicopter transport should return to the primary and secondary bases as timely as possible.

As OCS operations have progressively moved into deeper waters, larger vessels with deeper drafts have been phased into service, mainly for their greater range, faster speed, and larger carrying capacity. Service bases with the greatest appeal for deepwater activity have several common characteristics: strong and reliable transportation systems; adequate depth and width of navigation channels; adequate port facilities; existing petroleum industry support infrastructure; location central to OCS deepwater activities; adequate worker population within commuting distance; and insightful strong leadership. Typically, deeper draft service vessels require channels with depths of 20-26 ft (6-8 m).

The MMS reviewed exploration and development plans near the 181 South Area. All plans reviewed identified Port Fourchon as the primary service base; however, for some plans, other bases instead of Port Fourchon were identified for either crew or helicopter (i.e., Galliano and Venice, Louisiana), or as a backup to Port Fourchon (i.e., Venice, Louisiana).

For the near term, Port Fourchon would most likely be the primary service base to support oil and gas activity in the 181 South Area. Because of the limited amount of land available at Port Fourchon, the port may face capacity constraints in the long term. Operators are also looking to diversify risk from shutdowns like those experienced after Hurricanes Katrina and Rita, and are therefore likely to look to other ports. Thus, in the longer term, other deepwater access ports such as Theodore and Mobile, Alabama, and Pascagoula, Mississippi, could also support the 181 South Area.

For the 181 South Area scenario analysis, MMS estimates that there would be approximately 4 trips per week by supply vessels to a facility during drilling and production, approximately 8 trips per week by crewboats during drilling operations, and approximately 14 helicopter round trips per week to a production facility.

Hurricane Impacts on Service Bases

While some service bases only suffered minimal damage from the back-to-back Hurricanes Katrina and Rita in 2005, others did not fare so well. The Port of New Orleans and the Port of South Louisiana both were able to resume limited operations shortly after Hurricane Katrina. The Port of New Orleans suffered extensive damage, yet by the end of March 2006, approximately 70 percent of the Port of New Orleans was operational and 85 percent of workers had returned. Officials at the Port of South Louisiana assessed the damage at approximately $2 million (Louisiana Hurricane Resources, 2006). Port Fourchon suffered both wind and water damage during both hurricanes. It took on 2-8 ft (1-2 m) of water in both hurricanes and suffered $7 million in damage. However, within a week of the storm, the port was approaching 35-45 percent of pre-Katrina activity, and after a month, it was at 90 percent (Russell, 2006).

Of the ports in Louisiana that service the offshore oil and gas industry, the Ports of Venice and Cameron were the hardest hit and took the longest to return to near normal operation levels. However, as of late August 2006, all of the U.S. Gulf Coast seaports impacted by Hurricanes Katrina and Rita have returned their operations up to, at, or near what they were before the storms hit (Dismukes, personal communication, 2006). Two years after the storms, all but two of the tenants had returned to the Port of Venice, and only one site out of 61 was not leased. In addition to the improvements made at the port to recover from the storm, Venice is planning $10 to $15 million in improvements during the next five years (Russell, 2007).

The Venice Port Complex and officials in Plaquemines Parish, Louisiana have been working together to advance a project to deepen Baptiste Collette Bayou from its current authorized depth of 16-27 ft (4.9-8.2 m) to handle the large vessels needed to service the deep waters of the Gulf of Mexico. While such a project can take about 15 years to even get started, the port and Plaquemines Parish officials are pressing to get that time compressed into five years. The Parish is paying for a $250,000 reconnaissance study, normally done by the USCOE, to determine whether dredging would be in the Federal interest. After that study, a $3 million feasibility study will be necessary. The dredging itself is expected to cost $30 to $40 million (Russell, 2007).

Although operations at both Venice and Cameron, Louisiana are nearly back to normal, as of January 2008, the surrounding communities still face challenges associated with normal day-to-day living requirements. Housing opportunities near Venice have improved from a year ago, primarily through the addition of trailers and other mobile homes, and some limited grocery and food service has been restored close to the port facilities. However, there are still few restaurants open and hours of operation are limited. The recovery near Cameron appears to be even slower than what is occurring in Venice, particularly in terms of housing opportunities (Dismukes, personal communication, 2007). It is still common for companies operating at the ports to provide housing and three meals a day while employees work typical offshore schedules such as 7 days on/7 days off or 14 days on/14 days off to allow for long commutes (Russell, 2007).

Navigation Channels

The analysis performed to identify current OCS service bases (Chapter 3.3.5.8.1 of the Multisale EIS) was also used to identify relevant navigation waterways that support OCS activities. Table 3-36 of the Multisale EIS identifies the waterways and their maintained depth, while Figure 3-17 of the Multisale EIS shows their locations throughout the analysis area. No new navigation channels are expected to be dredged as a result of a proposed action; however, a proposed action would contribute to maintenance dredging of existing navigational canals.

3.1.2.2. Gas Processing Plants

Chapter 4.1.2.1.4.2 in the Multisale EIS describes gas processing plants that process raw gas to remove impurities such as water, carbon dioxide, sulfur, and inert gases, and transform it into a sellable, useful energy source. At present, there are 249 gas processing plants in the Gulf States, representing 58 percent of U.S. gas processing capacity (USDOE, EIA, 2006a). The distribution of these plants by state is shown in Table 3-38 of the Multisale EIS.

More than half of the current natural gas processing plant capacity in the U.S. is located convenient to Federal offshore Texas and Louisiana. Four of the largest capacity natural gas processing/treatment plants are found in Louisiana, while the greatest number of individual natural gas plants is located in Texas. Louisiana continues to lead the U.S. states in processing capacity, followed closely by Texas. Between them, the two states hold more than 53 percent of the Nation's natural gas processing capacity (USDOE, EIA, 2006a).

The MMS projects that up to 14 new gas processing plants with a facility size of 1.75 billion cubic feet per day (Bcf/d) could be needed, assuming average retirement and no expansions and/or the addition of new capacity to replace what is physically depreciating over the next 40 years at all existing facilities (Table 4-9 of the Multisale EIS). Of these, two are in Texas, three are in Louisiana, and nine are in the Mississippi-Alabama area. In reality, it is likely that few (if any) new, greenfield gas processing facilities would be developed along the Central or Western Gulf of Mexico. It is much more likely that a large share of the natural gas processing capacity that is needed in the industry will be located at existing facilities, using future investments for expansions and/or to replace depreciated capital equipment for a variety of reasons. These reasons include lower development costs because of existing structures and utility services; existing interconnections to pipelines, natural gas liquid lines, and fractionators; incremental labor requirements that are low relative to new facility staffing; the advantages of existing support, logistical and supply relationships such a vendors and maintenance support; and general economies of scale (Dismukes, personal communication, 2007). An example of this likely gas processing development scenario can be seen with the Venice Gas Processing facility in Plaquemines Parish, which has expanded several times to a current maximum capacity of 1.3 Bcf/d since it was developed in 1996 as an 810 million cubic feet per day (MMcf/d) facility (Dismukes, personal communication, 2007).

At present, there is considerable excess gas capacity in the Gulf of Mexico. Existing gas capacity is sufficient to handle the additional 0.129-0.176 Tcf of gas projected to be produced over 40 years as a result of the addition of the 181 South Area. However, near the end of the 40-year life of a proposed action, 0-1 new facilities are expected to be constructed as a result of a CPA (including the 181 South Area) or WPA proposed action.

3.1.2.3. Coastal Pipelines

Chapters 3.3.5.8.8 and 4.1.2.1.7 of the Multisale EIS discuss OCS pipelines in coastal waters (State offshore and inland waters) and coastal onshore areas. The OCS pipelines near shore and onshore may join pipelines carrying production from State waters or territories for transport to processing facilities or to distribution pipelines located farther inland.

The MMS projected the number of Federal OCS landfalls that may result from proposed lease sales in order to analyze the potential impacts to wetlands and other coastal habitats. In the Multisale EIS and other previous EIS's and EA's, MMS assumed that the majority of new Federal OCS pipelines would connect to the existing infrastructure in Federal and State waters and that very few would result in new pipeline landfalls. Therefore, MMS projected up to one pipeline landfall per lease sale; however, recent MMS analysis showed that even one landfall as a result of an individual lease sale may be unlikely (USDOI, MMS, 2007f). Although there will be some instances where new pipelines may need to be constructed, there is nothing to suggest any dramatic shifts in the trends in new Federal OCS landfalls given the current outlook for Gulf of Mexico development, particularly in coastal Louisiana (Dismukes, personal communication, 2007). While there are some opportunities for new pipeline landfalls from increased production activity, many of those will be limited due to a number of factors associated with basic pipeline economics.

The Multisale EIS and **Tables 3-2 and 3-3** of this SEIS state that 0-1 new landfalls are projected for a CPA proposed action and 0-1 new landfalls are projected for a WPA proposed action. These projections were not increased as a result of the addition of the 181 South Area. Production from the 181 South Area would likely begin eight or more years after a lease sale. By that time it is anticipated that existing pipelines will have adequate capacity to transport the gas production from the 181 South Area. Because of the lack of existing pipelines in the vicinity of the 181 South Area, initial oil production would most likely be transported to market via FPSO's. The construction of new pipelines within the 181 South Area would depend on the location of production structures and the amount of production, but the structures would likely still connect to existing pipeline systems and would not result in new pipeline landfalls.

3.1.2.4. Disposal and Storage Facilities for Offshore Operations

Chapters 3.3.5.8.7 and 4.1.2.1.6 of the Multisale EIS describe the infrastructure network needed to manage the spectrum of waste generated by OCS exploration and production activities and returned to land for management. The analyses of coastal infrastructure presented in the Multisale EIS and other previous EIS's and EA's concluded that no new solid-waste facilities would be built as a result of a single lease sale or as a result of the OCS Program. Recent research further supports these past conclusions that existing solid-waste disposal infrastructure is adequate to support both existing and projected offshore oil and gas drilling and production needs (Dismukes et al., 2007).

Although the addition of the 181 South Area resulted in some increases in the activity scenario for a typical CPA proposed action, these minor increases in activity were not significant enough to affect the long-term (i.e., 40-year) forecasts of waste disposal and storage needs to support either a typical CPA sale or the OCS Program.

3.2. IMPACT-PRODUCING FACTORS AND SCENARIO—ACCIDENTAL EVENTS

Regulatory requirements have been established since the 1980's to help prevent accidents and spills. The MMS pollution-prevention requirements include features such as redundant safety systems, and periodic inspection and testing protocols. Chapter 4.3 of the Multisale EIS 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 a proposed lease sale, which are summarized below. Estimates of accidental events that could result from activities associated with a proposed action have been updated to take into account the addition of the 181 South Area.

3.2.1. Oil Spills

Oil spills are unplanned, accidental events but their frequency and volume can be estimated from past occurrences. Chapter 4.3.1 of the Multisale EIS analyzes the risk of spills that could occur as a result of activities associated with a proposed action in the CPA or WPA.

Chapter 4.3.1.1 of the Multisale EIS discusses spill prevention. Chapter 4.3.1.2 of the Multisale EIS provides an overview of spill risk analysis including more information about the inputs to the spill scenario and the trajectory and weathering modeling. Chapter 4.3.1.3 of the Multisale EIS discusses past OCS spills. Chapter 4.1.3.4.4.2 of the Multisale EIS discusses the cause and volume of spills that resulted from the hurricanes in 2005.

Oil also enters the Gulf of Mexico by pathways other than spills. These major sources of oil inputs to the Gulf of Mexico include natural seeps, permitted discharges, and sources related to human activities and are discussed in Chapter 4.1.3.4 of the Multisale EIS and **Chapter 3.1.1.3** of this SEIS.

Chapter 4.3.1.4 of the Multisale EIS discusses the physical and chemical properties of oil. The properties of the spilled oil can influence the persistence of the spill on the water's surface and the success of spill cleanup efforts. Oil discovered in the 181 South Area will likely be heavier oil, 20^{o}-30^{o} API, than the oil represented in the Multisale EIS. A spill of heavier oil may present additional response challenges. Heavier oils may have a higher viscosity and less dispersibility than lighter oils (Trudel et al., 2001). The "window of opportunity" for dispersant application could be shorter and the heavier oils may also be more likely to emulsify and form tarballs.

As spill size increases, the occurrence rate decreases and so the number of spills estimated to occur decreases (**Tables 3-6 and 3-7**). In general terms, coastal waters adjacent to the CPA and WPA are expected to be impacted by many, frequent, small spills (≤1 bbl); few, infrequent, moderately-sized spills (>1 and <1,000 bbl); and rarely a large spill (≥1,000 bbl) as a result of activities associated with a proposed action.

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 proposed actions.

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

Methods

Chapter 4.3.1.5 of the Multisale EIS addresses the risk of offshore spills ≥1,000 bbl that could occur from accidents associated with activities resulting from a proposed action. Spill rates (Table 4-16 of the Multisale EIS) were calculated based on the assumption that spills occur in direct proportion to the volume of oil handled and are expressed as number of spills per billion barrels of oil handled. A published paper by MMS authors provides more information on OCS spill-rate methodologies and trends (Anderson and LaBelle, 2000). A discussion of how the range of resource estimates was developed is provided in Chapter 4.1.1.1 of the Multisale EIS and **Chapter 3.1.1** of this SEIS.

The mean number of future offshore spills ≥1,000 bbl is calculated by multiplying the spill occurrence rate for spills ≥1,000 bbl (1.51) by the volume of oil estimated to be produced as a result of a proposed action. The median size of spills ≥1,000 bbl that occurred during 1985-1999 is 4,551 bbl, and the median size for spills ≥10,000 bbl is 15,000 bbl (Table 4-16 of the Multisale EIS). Based on these median sizes, MMS estimates that the most likely size of an offshore spill ≥1,000 bbl resulting from a proposed action would be 4,600 bbl.

Probability Results

As shown on **Table 3-6 and Figures 3-4 and 3-5,** the mean number of offshore spills ≥1,000 bbl estimated for a proposed action in the CPA is 1-2 spills (mean equal to 1.22-2.02) with a 70-87 percent chance of one or more spills occurring. The incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the number of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. The mean number of spills estimated for a proposed action in the WPA is <1 spill (mean equal to 0.37-0.62) with a 31-46 percent chance of one or more spills ≥1,000 bbl occurring.

Fate

Offshore spills ≥1,000 bbl are the most likely to persist long enough on the water's surface to impact the shoreline. The fate of an oil spill is influenced by many variables. Aspects that influence spill persistence are discussed in Chapter 4.3.2.5.4 of the Multisale EIS and summarized below.

Tables 4-37 and 4-36 of the Multisale EIS provide a mass balance over time for a hypothetical spill related to a proposed action in the CPA and WPA, respectively. The MMS estimates that an offshore spill ≥1,000 bbl of a typical Gulf of Mexico oil would dissipate from the water surface in 2-10 days. As mentioned previously, the API gravities of the oil from the 181 South Area may be heavier and would therefore weather differently. Weathering processes include evaporation of volatile hydrocarbons into the atmosphere, dissolution of soluble components, dispersion of oil droplets into the water column, emulsification and spreading of the slick on the surface of the water, chemo- or photo-oxidation of specific compounds creating new components that are often more soluble, and biodegradation.

Over time, if the slick is not completely dissipated, a tar-like residue may be left; this residue breaks up into smaller tar lumps or tarballs that usually sink below the sea surface but not necessarily to the seafloor. Not all oils form tarballs; many Gulf of Mexico oils do not (Jefferies, 1979).

The MMS uses the SINTEF model to numerically model weathering processes (Daling et al., 1997; Reed et al., 2000; Prentki et al., 2004). Model results from the SINTEF weathering model are presented in Tables 4-36 and 4-37 of the Multisale EIS. Four scenarios were modeled. Information on the SINTEF model can be found in Daling et al. (1997), Reed et al. (2000), and Prentki et al. (2004).

Movement into the deep waters of the Gulf of Mexico increasingly relies on subsea production infrastructure, possibly increasing the risk of seafloor releases. All evidence to date indicates that accidental oil discharges that occur at the seafloor (e.g., from a loss of well control or a pipeline break) would rise in the water column, surfacing almost directly over the source location. Additional information about the fate of a seafloor release is presented in Chapter 4.3.1.5.4 of the Multisale EIS.

Chapter 4.3.1.5.6 of the Multisale EIS provides an estimate of the length of coastline affected by offshore spills ≥1,000 bbl. The maximum length of shoreline affected by a representative spill ≥1,000 bbl is estimated to be 30-50 km (19-31 mi) of shoreline, assuming such a spill were to reach land within 12 hours (hr). Some redistribution of the oil due to longshore currents and further smearing of the slick from its original landfall could also occur.

Likelihood of Occurring and Contacting Environmental Resources

The MMS uses the Oil Spill Risk Assessment (OSRA) model to estimate the likely trajectories of hypothetical offshore spills ≥1,000 bbl. The trajectories, combined with estimated spill occurrence, are used to estimate the risk of future spills occurring and contacting environmental features. Chapter 4.3.1.5.5 of the Multisale EIS briefly summarized the OSRA model, while Ji et al. (2007) provides a detailed description of the OSRA model.

A more complete measure of spill risk was calculated by multiplying the probability of contact generated by the OSRA model by the probability of occurrence of one or more spills ≥1,000 bbl as a result of a proposed action. This provides a risk factor that represents the probability of a spill occurring as a result of a proposed action and contacting the environmental resource of concern. These numbers are often referred to as "combined probabilities" because they combine the risk of occurrence of a spill ≥1,000 bbl from OCS sources and the risk of such a spill contacting environmental resources. The combined probabilities are provided for each resource of concern in Figures 4-13 through 4-31 of the Multisale EIS.

To better reflect the geologic distribution of oil and gas resources and natural variances of meteorological and oceanographic conditions in the computation of combined probabilities, MMS also generated combined probabilities for smaller areas within the CPA and WPA. The MMS used a cluster analysis to analyze the contact probabilities generated for each of the 4,000 launch points. For this analysis, similar trajectories and contact to 10-mi (16-km) shoreline segments were used to identify offshore cluster areas. The estimated oil production from a proposed action was proportionally distributed to the cluster areas and the likelihood of spill occurrence was calculated for each cluster area. The probability of spill occurrence was combined with probabilities of contact from the trajectory modeling to estimate the combined risk of spills occurring and contacting various resources from spills in each cluster area. To account for the risk of spills occurring from the transportation of oil to shore, generalized pipeline corridors originating within each of the offshore cluster areas and terminating at major oil pipeline landfall areas were developed. The oil volume estimated to be produced as a result of a proposed action within each cluster area was proportioned among the pipeline corridors. The mean number of spills and the probability of contact of spills from each pipeline corridor were then calculated and combined with the risk of spills occurring and contacting resources from OCS facility development and production operations to complete the analysis.

Inclusion of the 181 South Area increased the estimate of oil production for a CPA proposed action by 0.031-0.044 BBO, and the proposed CPA sale area by 4.3 million ac (6,719 mi^2). For this SEIS, the OSRA model was rerun due to the revised geographic area and increased oil production estimates in comparison with those used for the Multisale EIS. Results from this OSRA run confirmed that the revised geographic area and increased oil production estimates did not substantially affect probabilities in comparison with those obtained from the previous OSRA run. Updated spill occurrence probabilities that were computed based on these higher production estimates are shown in Tables 1a and 1b of Ji et al. (in preparation). The additional oil production is not projected to substantially increase the probabilities for occurrence of offshore spills ≥1,000 bbl (**Table 3-6**). Activity that would result from the addition of the 181 South Area would cause a negligible increase, if any, in the risk of an offshore spill ≥1,000 bbl occurring and contacting environmental resources (**Figures 3-6 through 3-11**).

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

Methods

Chapter 4.3.1.6 of the Multisale EIS addresses the risk of spills <1,000 bbl that could occur from accidents associated with activities resulting from a proposed action.

Analysis of historical data shows that most offshore OCS oil spills have been ≤1 bbl (Figure 4-32 of the Multisale EIS). Although spills of ≤1 bbl have made up 94 percent of all OCS-related spill occurrences; spills of this size have contributed very little (5%) 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.

Likelihood of Occurring and Contacting Environmental Resources

The number of offshore spills <1,000 bbl estimated to occur over the next 40 years as a result of a proposed action is provided in Table 4-35 of the Multisale EIS and has been updated to reflect the addition of the 181 South Area (**Table 3-6**). The number of spills is estimated by multiplying the oil-spill rate for each of the different spill size groups by the projected oil production as a result of a proposed action (**Table 3-1**). As spill size increases, the occurrence rate decreases and so the number of spills estimated to occur decreases. The average spill size is used for spills with size <1 bbl. For the larger spill size ranges, the median spill size calculated for each category from MMS historical records is used. During the 40-year analysis period, 97 percent of spills <1,000 bbl estimated to occur as a result of a proposed action would be ≤1 bbl.

In the spill size range of >50-500 bbl, 6-9 spills are estimated to occur from activities related to a CPA proposed action, and 2-3 spills are estimated to occur from activities related to a WPA proposed action.

The number of spills >500 and <1,000 bbl estimated to occur is less than one for a CPA proposed action. The number of spills >500 and <1,000 bbl estimated to occur is less than one for a WPA proposed action. The chance of one spill between 500 and 1,000 bbl occurring is 26-34 percent for a CPA proposed action and 11-17 percent for a WPA proposed action.

The incremental increase in oil production from the addition of the 181 South Area to the proposed CPA sale area resulted in a slight increase in the estimated number of oil spills <500 bbl likely to occur as a result of a CPA proposed action. The addition of the 181 South Area did not result in an increase in the estimated number of spills >500 bbl.

Fate

For an offshore spill <1,000 bbl to make landfall, the spill would have to occur proximate to State waters (defined as 3-12 mi or 6-19 km from shore). If a spill were to occur proximate to State waters, only a spill >50 bbl would be expected to have a chance of persisting long enough to reach land. Spills >50 and <1,000 bbl size occur infrequently. Should such a spill occur, the volume that would make landfall would be expected to be extremely small (a few barrels). These assumptions are supported by a previous analysis of 3-day trajectory model runs, previous weathering analyses, and historical records of spill incidents.

The persistence of slicks from spills <1,000 bbl ranges from a few minutes (<1 bbl original spill size) to a few days (10-1,000 bbl original spill size) on the open ocean. Spilled oil would rapidly spread out, evaporate, and weather, quickly becoming dispersed into the water column. Most spills <1,000 bbl are expected to be diesel, which dissipates very rapidly. Diesel is a distillate of crude oil and does not contain the heavier components that contribute to crude oil's longer persistence in the environment. Because spills <1,000 bbl are not expected to persist as a slick on the surface of the water beyond a few days and because spills on the OCS would occur at least 3-10 nmi (6-19 km) from shore, it is unlikely that any spills would make landfall prior to breaking up. Only spills >50 bbl have a chance of remaining a cohesive mass long enough to be transported any distance.

3.2.1.3. Risk Analysis for Coastal Spills

Chapter 4.3.1.7 of the Multisale EIS addresses the risk of spills of all sizes that could occur from accidents associated with activities resulting from a proposed action.

Spills in coastal waters could occur as a result of transportation and handling of OCS-produced oil as it passes through State offshore waters and along navigation channels, rivers, and through coastal bays. The MMS projects that almost all (>99%) oil produced in waters <800 ft as a result of a proposed action will be brought ashore via pipelines while 50-100 percent of oil produced in waters >800 ft will be brought ashore via tanker. Because piped 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.

Records of spills in coastal waters and State offshore waters are maintained by the USCG (USDOT, CG, 2007), which does not identify the source of the oil (i.e., OCS and non-OCS). Several USCG resources were used to estimate the number of coastal oil spills attributable to a proposed action, including the USCG Polluting Incident Compendium and data obtained from the USCG. The estimated number of spills in coastal waters that could be due to the proposed action is presented in Table 4-38 of the Multisale EIS. More information on the estimated number and most likely sizes of coastal spills, and the likelihood of coastal spill contacting with various resources is presented in Chapters 4.3.1.7.1 and 4.3.1.7.2 of the Multisale EIS.

The coastal spill rate is based on historical spills and the projected amount of oil production. For the purpose of this analysis, coastal spills are assumed to occur where oil production is brought to shore. **Figure 3-12** shows major oil pipeline landfall areas. It is projected that the majority of oil production for a CPA proposed action will be brought to shore in eastern Louisiana, from Atchafalaya Bay to east of the Mississippi River. Based on this assumption the majority of coastal spills are projected to occur in this area, including one spill ≥1,000 bbl (assumed size 3,000 bbl) estimated to occur as the result of a CPA proposed action. Because the majority of oil production from a WPA proposed action is projected to be brought to shore in the Galveston/Houston/Texas City Area, it is assumed the majority of coastal spills from a WPA proposed action will also occur in this area.

3.2.1.4. Risk Analysis by Resource

Chapter 4.3.1.8 of the Multisale EIS summarizes MMS's information on the risk to resources from oil spills and oil slicks that could occur as a result of a proposed action in the CPA or WPA. The risk results are based on MMS's estimates of likely spill locations, sources, sizes, frequency of occurrence, physical fates of different types of oil slicks, and probable transport. For offshore spills, the analysis presents combined probabilities, which include both the likelihood of a spill from a proposed action occurring and the likelihood of the oil slick reaching areas where known environmental resources occur. 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 by environmental and socioeconomic resource in Chapter 4.4 of the Multisale EIS. The coastal spill risk is estimated from historic rate, not a probability.

3.2.1.5. Spill Response

3.2.1.5.1. MMS Spill-Response Requirements and Initiatives

To ensure that industry maintains effective oil-spill-response capabilities, MMS

- requires immediate notification for spills >1 bbl—all spills require notification to the USCG and MMS 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;
- oversees 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.

3.2.1.5.2. Offshore Response and Cleanup Technology

Chapter 4.3.5.2 of the Multisale EIS discusses a number of cleanup techniques that are available for response to an offshore oil spill. Open-water response options include mechanical recovery, chemical dispersion, *in-situ* burning, or natural dispersion. Single or multiple spill-response cleanup techniques may be used in abating a spill. The cleanup technique chosen for a spill response will vary depending upon the unique aspects of each situation. The selected mix of countermeasures will depend upon the shoreline and natural resources that may be impacted; the size, location, and type of oil spilled; weather; and other variables. The overall objective of on-water recovery is to minimize the risk of impact by preventing the spread of free-floating oil. The physical and chemical properties of crude oil can greatly affect the effectiveness of containment and recovery equipment, dispersant application, and *in-situ* burning. It is expected that oil found in the majority of the proposed lease sale areas could range from a medium-weight oil to condensates. Although still a medium weight oil, the oil expected in the 181 South

Area and other extremely deep areas of the proposed lease sale area would tend to be a somewhat heavier oil than is found elsewhere in the lease sale area, ranging from 20 to30° API.

Mechanical Cleanup

Generally, mechanical containment and recovery is the primary oil-spill-response method used (33 CFR 153.305(a)). Mechanical recovery is the process of using booms and skimmers to pick up oil from the water surface. It is expected that the oil-spill-response equipment needed to respond to an offshore spill in the proposed lease sale areas could be called out from one or more of the following oil-spill equipment base locations: Corpus Christi, Aransas Pass, Houston, La Porte, Ingleside, Port Arthur, and Galveston, Texas; Lake Charles, New Iberia, Belle Chase, Cameron, Cocodrie, Morgan City, New Orleans, Sulphur, Houma, Fourchon, Fort Jackson, and Venice, Louisiana; Pascagoula, Mississippi; Theodore and Mobile, Alabama; or Pensacola, Ft. Lauderdale, Panama City, and Tampa, Florida. Response times for any of this equipment would vary, dependent on the location of the equipment, the staging area, and the spill site; and on the transport requirements for the type of equipment procured. It is anticipated that equipment would be procured from the closest available oil-spill equipment bases. For example, due to the location of the 181 South Area, it would be quicker to use equipment from established oil-spill equipment bases located within the State of Louisiana.

It is assumed that 10-30 percent of an oil spill in an offshore environment can be mechanically removed from the water prior to the spill making landfall (U.S. Congress, Office of Technology Assessment, 1990).

Should an oil spill occur during a storm, spill response from shore would occur following the storm. Spill response would not be possible while storm conditions continued, given the sea state limitations for skimming vessels and containment boom deployment. However, oil released onto the ocean surface during a storm event would be subject to accelerated rates of weathering and dissolution (i.e., oil and water would be agitated, forcing oil into smaller droplets and facilitating dissolution of the high end aromatic compounds present).

Dispersants

When dispersants are applied to spilled crude oil, the surface tension of the oil is reduced. This allows normal wind and wave action to break the oil into tiny droplets, which are dispersed into the upper portion of the water column. Natural processes then break down these droplets much quicker than they would if the oil were allowed to remain on the water surface.

Dispersant use must be in accordance with the Regional Response Teams' Preapproved Dispersant Use Manual and any conditions outlined within a Regional Response Team site-specific dispersant approval given after a spill event. Consequently, dispersant use would be in accordance with the restrictions for specific water depths, distances from shore, or monitoring requirements. For a deepwater (>1,000 ft or >305 m water depth) spill ≥1,000 bbl, which could include the 181 South Area, dispersant application may be a preferred response in the open-water environment to prevent oil from reaching a coastal area, in addition to mechanical response. However, the window of opportunity for successful dispersant application may be somewhat narrower for some of these locations dependent upon the physical and chemical properties of these deeper oils, which tend to be somewhat heavier than those found closer to shore. A significant reduction in the window of opportunity for dispersant application may render this response option ineffective.

Based on the present location of dispersant stockpiles and dispersant application equipment in the Gulf of Mexico, it is expected that the dispersant application aircraft initially called out for an oil-spill response to an offshore spill in the proposed lease sale area will come from Houma, Louisiana; Stennis, Mississippi; or Coolidge, Arizona. The dispersants will come from locations primarily in Texas and Louisiana. Response times for this equipment would vary, depending on the spill site and on the transport time for additional supplies of dispersants to arrive at a staging location. Based on historic information, this SEIS assumes that dispersant application will be effective on 20-50 percent (S.L. Ross Environmental Research Ltd., 2000) of the treated oil.

Should an oil spill occur during a storm, dispersant application would occur following the storm. Aerial and vessel dispersant application would not be possible while storm conditions continued. However, oil released onto the ocean surface during a storm event would be subject to accelerated rates of weathering and dissolution (i.e., oil and water would be agitated, forcing oil into smaller droplets and facilitating dissolution of the high-end aromatic compounds present).

In-situ Burning

In-situ burning is an oil-spill cleanup technique that involves the controlled burning of the oil at or near a spill site. The use of this spill-response technique can provide the potential for the removal of large amounts of oil over an extensive area in less time than other techniques. *In-situ* burning involves the same oil collection process used in mechanical recovery, except instead of going into a skimmer, the oil is funneled into a fire-boom, a specialized boom that has been constructed to withstand the high temperatures from burning oil. While *in-situ* burning is another method for disposing of oil that has been collected in a boom, this method is typically more effective than skimmers when the oil is highly concentrated.

Response times for bringing a fire-resistant boom onsite would vary, depending on the location of the equipment, the staging area, and the spill site.

Should an oil spill occur during a storm, *in-situ* burning would occur following the storm. *In-situ* burning would not be possible while storm conditions continued.

Natural Dispersion

In some instances, the best response to a spill may be to allow the natural dispersion of a slick to occur. Natural dispersion may be a preferred option for smaller spills of lighter nonpersistent oils and condensates that form slicks that are too thin to be removed by conventional methods and are expected to dissipate rapidly, particularly if there are no identified potential impacts to offshore resources and a potential for shoreline impact is not indicated. In addition, natural dispersion may also be a preferred option in some nearshore environments when the potential damage caused by a cleanup effort could cause more damage than the spill itself.

3.2.1.5.3. Oil-Spill-Response Assumptions Used in the Analysis of a Most Likely Spill ≥1,000 bbl Incident Related to a Proposed Action

Tables 4-36 and 4-37 and Chapter 4.3.5.3 of the Multisale EIS present the estimated amounts of oil that will either be removed by the application of dispersants or mechanically recovered for 4,600-bbl pipeline spill scenarios analyzed in the Multisale EIS. The scenarios assumed oils of 30^{o} and 35^{o} API; however, heavier oil (20-30^{o} API) will likely be found in the 181 South Area.

3.2.1.5.4. Onshore Response and Cleanup

Offshore response and cleanup is preferable to shoreline cleanup; however, if an oil slick reaches the coastline it is expected that the specific shoreline cleanup countermeasures identified and prioritized in the appropriate Area Contingency Plans (ACP's) for various habitat types would be used. The sensitivity of the contaminated shoreline is the most important factor in the development of cleanup recommendations. Shorelines of low productivity and biomass can withstand more intrusive cleanup methods such as pressure washing. Shorelines of high productivity and biomass are very sensitive to intrusive cleanup methods, and in many cases, the cleanup is more damaging than allowing natural recovery.

Oil-spill-response planning in the United States is accomplished through a mandated set of interrelated plans. The ACP represents the third tier of the National Response Planning System and was mandated by OPA 90. The ACP's cover subregional geographic areas. The ACP's are a focal point of response planning, providing detailed information on response procedures, priorities, and appropriate countermeasures. The Gulf coastal area that falls within USCG District 8 is covered by the One Gulf Plan ACP, which includes separate Geographic Response Plans for areas covered by USCG Sector Corpus Christi, Sector Houston/Galveston, Sector Port Arthur, Sector Morgan City, Sector New Orleans, and Sector Mobile. The Miami ACP covers the remaining Gulf coastal area. The ACP's are written and maintained by Area Committees assembled from Federal, State, and local governmental agencies that have pollution response authority; nongovernmental participants may attend meetings and provide input.

The coastal Area Committees are chaired by respective Federal On-Scene Coordinators from the appropriate USCG Office and are comprised of members from local or area-specific jurisdictions. Response procedures identified within an ACP or its Geographic Response Plan(s) reflect the priorities and procedures agreed to by members of the Area Committees.

The single most frequently recommended spill-response strategy for the areas identified for protection in all of the applicable ACP's or it's Geographic Response Plans is the use of a shoreline boom to deflect oil away from coastal resources such as seagrass beds, marinas, resting areas for migratory birds, bird and turtle nesting areas, etc. If a shoreline is oiled, the selection of the type of shoreline remediation to be used will depend on the following: (1) the type and amount of oil on the shore; (2) the nature of the affected coastline; (3) the depth of oil penetration into the sediments; (4) the accessibility and the ability of vehicles to travel along the shoreline; (5) the possible ecological damage of the treatment to the shoreline environment; (6) weather conditions; (7) the current state of the oil; and (8) jurisdictional considerations.

Shoreline Cleanup Countermeasures

The following assumptions regarding the cleanup of spills that contact coastal resources in the area of consideration reflect a generalization of the site-specific guidance provided in the ACP's or its Geographic Response Plans applicable to the Gulf of Mexico. As stated in Chapter 4.3.1.4 of the Multisale EIS, for this analysis it is expected that a typical oil spilled as a result of an accident associated with a proposed action would be within the range of 30-35° API. Since the following discussion is intended to address the most likely spill scenario discussed in Chapter 4.3.5.3 of the Multisale EIS, cleanup countermeasures for a medium-weight oil are all that are included in the following discussion. The ACP's applicable to the Gulf coastal area cover a vast geographical area. The differences in the response priorities and procedures among the various ACP's or its Geographic Response Plans reflect the differences in the identified resources needing spill protection in the area covered by each ACP or its Geographic Response Plans:

- *Barrier Island/Fine Sand Beaches Cleanup*: After the oiling of a barrier island/fine sand beach with a medium-weight oil, applicable cleanup options are manual removal, trenching (recovery wells), sediment removal, cold-water deluge flooding, shore removal/replacement, and warm-water washing. Other possible shoreline countermeasures include low-pressure cold-water washing, burning, and nutrient enhancement. Responders are requested to avoid the following countermeasures: no action; passive collection (sorbents); high-pressure, cold-water washing; hot-water washing; slurry sand blasting; vacuum; and vegetation cutting.
- *Fresh or Salt Marsh Cleanup*: In all cases, cleanup options that avoid causing additional damage to the marshes will be selected. After the oiling of a fresh or salt marsh with a medium-weight oil, the preferred cleanup option would be to take no action. Another applicable alternative would be trenching (recovery wells). Shore removal/replacement, vegetation cutting, or nutrient enhancement could be used. The option of using vegetation cutting as a shoreline countermeasure will depend upon the time of the year and will be considered generally only if re-oiling of birds is possible. Chemical treatment, burning, and bacterial addition as countermeasures under consideration. Responders are advised to avoid manual removal, passive collection, debris removal/heavy equipment, sediment removal, cold-water flooding, high- or low-pressure cold-water washing, warm-water washing, hot-water washing, slurry sand blasting, and shore removal/replacement.
- *Coarse Sand/Gravel Beaches Cleanup*: After the oiling of a coarse sand/gravel beach with a medium-weight oil applicable cleanup options are manual removal, trenching (recovery wells), sediment removal, cold-water deluge flooding, and shore removal/replacement. Other possible shoreline countermeasures include low-pressure, cold-water washing; burning; warm-water washing; and nutrient enhancement. Responders are requested to avoid the following countermeasures: no

action; passive collection (sorbents); high-pressure, cold-water washing; hot-water washing; slurry sand blasting; vacuum; and vegetation cutting.

- *Exposed or Sheltered Tidal Flats Cleanup*: After the oiling of an exposed or sheltered tidal flat with a medium-weight oil, the preferred cleanup option is no action. Other applicable shoreline countermeasures for this resource include trenching (recovery wells) and cold-water deluge flooding. Other possible shoreline countermeasures listed include low-pressure, cold-water washing; vacuum; vegetation cutting; and nutrient enhancement. Responders are requested to avoid manual removal; passive collection; debris removal/heavy equipment; sediment removal; high-pressure, cold-water washing; warm-water washing; hot-water washing; slurry sand blasting; and shore removal replacement.
- *Seawall/Pier Cleanup*: After the oiling of a seawall or pier with a medium-weight oil, the applicable cleanup options include manual removal; cold-water flooding; low- and high-pressure, cold-water washing; warm-water washing; hot-water washing; slurry sand blasting; vacuum; and shore removal replacement. Other possible shoreline countermeasures listed include burning and nutrient enhancement. Responders are requested to avoid no action, passive collection (sorbents), trenching, sediment removal, and vegetation cutting.

3.2.2. Losses of Well Control

A loss of well control is the uncontrolled flow of a reservoir fluid that may result in the release of gas, condensate, oil, drilling fluids, sand, or water. Loss of well control is a broad term that includes very minor up to the most serious well control incidents, while blowouts are considered to be a subset of more serious incidents with greater risk of oil spill or human injury. Historically, most losses of well control have occurred during development drilling operations, but loss of well control can happen during exploratory drilling, production, well completions, or workover operations. Loss of well control may occur during drilling between zones in the wellbore or may occur at the seafloor. One-third of the losses of well control were associated with shallow gas flows. Most losses of well control last for a short duration, with half lasting less than a day. Chapter 4.3.3 of the Multisale EIS discusses losses of well control in detail.

Loss of well control may result in the release of synthetic drilling fluid, chemicals, or loss of oil. From 1996 to 2005, 21 percent of losses of well control resulted in spilled oil or SBF, or released gas or condensate. In addition to spills, the loss of well control can resuspend and disperse bottom sediments.

An additional 9-12 wells are projected to be drilled as a result of the addition of the 181 South Area per proposed CPA sale. Based on the blowout rate of 6 per 1,000 well starts, no additional blowouts are projected as a result of the addition of the 181 South Area.

3.2.3. Vessel Collisions

Safety fairways, traffic separation schemes, and anchorages are the most effective means of preventing vessel collisions with OCS structures. In general, fixed structures such as platforms and drilling rigs are prohibited in fairways. The MMS data show that, from 1996 to 2005, there were 129 OCS-related collisions. Approximately 10 percent of vessel collisions with platforms in the OCS caused diesel spills. Fires resulted from hydrocarbon releases in several of the collision incidents. Chapter 4.3.3.3 of the Multisale EIS provides a more detailed discussion of vessel collisions.

Chapter 3.3.5.7.3 of the Multisale EIS discusses damage to platforms from recent hurricanes. Platforms destroyed by hurricane force winds and waves become potential obstructions to offshore operators and mariners in the Gulf of Mexico. To prevent any further collisions with submerged or destroyed platforms, MMS, in December 2005, published a safety alert that provided the location of all facilities that were destroyed by Hurricanes Katrina and Rita.

3.2.4. Chemical and Drilling-Fluid Spills

Chemicals are used to condition drill muds in completions, stimulation, and workover processes and during production. Chemicals are stored offshore in quantities related to their uses. **Table 3-8** presents the number and volume of chemical and synthetic-based fluid (SBF) spills in the Gulf of Mexico during 2001-2005. Only two chemical spills of ≥1,000 bbl have occurred between 1964 and 2005.

Chemical Spills

Between 5 and 15 chemical spills are anticipated each year as a result of the OCS Program, with the majority being <50 bbl in size. The most common chemicals spilled are methanol, ethylene glycol, and zinc bromide. Additional production chemicals are needed in deepwater operations where hydrate formation is a possibility, but spill volumes are anticipated to remain the same because of advances in subsea processing. Chemical and drilling-fluid spills are discussed in greater detail in Chapter 4.3.4 of the Multisale EIS.

Synthetic-Based Fluid Spills

The SBF have been used since the mid 1990's. Between 5 and 20 SBF releases are anticipated each year as a result of the OCS Program, with the majority being <50 bbl in size (**Table 3-9**). An SBF spill of 1,061-bbl base fluid occurred in October 2007 due to a crack in the riser termination spool. This spill site will be studied using funds set aside and titled *Synthetic-based Fluid Spill of Opportunity Environmental Impact and Recovery* (Neff et al., 2000). The study explores recovery from a spill as opposed to recovery from permitted SBF-wetted cuttings discharges where most of the field research has been conducted. Resampling to document pollutant biodegradation and redistribution over time is presently not part of the study. The hurricanes in 2004 and 2005 resulted in increased chemical spills and the loss of containerized chemicals overboard. Mud slides and submerged and drifting rigs damaged pipelines and supply lines on the seafloor. Hurricane-related chemical and SBF releases may occur during the hurricane or afterwards when operations are brought back online.

3.3. CUMULATIVE ACTIVITIES SCENARIO

The following cumulative scenario includes all past, present, and reasonably foreseeable future human activities, including non-OCS activities, as well as all OCS activities (OCS Program). 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 impacts of cumulative activities on biological, physical, and socioeconomic resources are analyzed in Chapter 4.5 of the Multisale EIS and **Chapter 4.1** of this SEIS.

3.3.1. OCS Program

Chapter 4.1 of the Multisale EIS also describes the scenario for the OCS Program (i.e., activity resulting from past and future lease sales). 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. This includes projected activity from lease sales that have been held, but for which exploration or development has not yet begun or is continuing. Projected reserve/resource production for the OCS Program is 28.562-32.570 BBO and 142.366-162.722 Tcf of gas. Tables 4-4, 4-5, and 4-6 of the Multisale EIS present projections of the major activities and impact-producing factors related to future Gulfwide OCS Program activities. Projected new coastal infrastructure as a result of the OCS Program is shown in Table 4-9 of the Multisale EIS.

The MMS, Gulf of Mexico OCS Region, Resource and Evaluation Office's Modeling and Forecasting Team has reevaluated the exploration and development activity scenario for the OCS Program that was presented in the Multisale EIS. While the scenario for a typical CPA sale has been revised for the expanded sale area, the Gulfwide cumulative scenario has not changed. Relative to CPA and WPA sales, a very small amount of exploration and development activity is forecasted to occur as a result of the addition of the 181 South Area. Therefore, despite the additional acreage offered, the range of exploration and development activities forecasted to occur as a result of the OCS Program has not changed. The level of 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 environmental analysis sections of **Chapter 4.1**.

3.3.2. State Oil and Gas Activity

The coastal infrastructure that supports the OCS Program also supports State oil and gas activities. Chapters 3.3.5.9 and 4.1.3.1 of the Multisale EIS discuss in detail State oil and gas activities. A summary is presented below.

Offshore Oil and Gas Leasing and Production

Texas land extends 10.4 mi (16.7 km) offshore. The Railroad Commission of Texas is the agency charged by the Texas Legislature with the regulation of the oil and gas industry in the State of Texas. The Lands and Minerals Division of the Texas General Land Office holds lease sales quarterly in January, April, July, and October. Sales are usually held on the first Tuesday of the month; however, the January and July sales have been held in recent years on the second Tuesday of the month because of holidays.

The territorial waters of Louisiana extend Gulfward for 3 nmi (5.6 km). The Office of Mineral Resources holds regularly scheduled lease sales on the second Wednesday of every month. As in Texas, the State of Louisiana's offshore oil and gas leasing program is conducted on a regular basis irrespective of the Federal OCS mineral leasing program.

In recent years, oil and gas production in the State of Louisiana, as in Texas, has been declining. The MMS projects that the State's offshore production would continue this trend over the analysis period. Hurricanes Katrina and Rita (2005) also affected State oil and gas production. As of March 2006, 85.5 percent of the daily oil production capacity of a 38-parish region had been restored, and 97 percent of the daily gas production capacity had been restored (LADNR, 2006c).

The territorial waters of Mississippi extend Gulfward for 3 nmi (5.6 km). The State of Mississippi does not have an offshore oil and gas leasing program. The MMS does not expect the State to institute such a program in the near future.

The territorial waters of Alabama extend Gulfward for 3 nmi (5.6 km) and its shoreline extends 52 mi (84 km). Alabama has no established schedule of lease sales. The limited number of tracts in State waters has resulted in the State not holding regularly scheduled lease sales. The last lease sale was held in 1997. The MMS does not expect the State to institute such a program in the near future.

The State of Florida has experienced very limited drilling in coastal waters. In 2005, Florida's Governor Jeb Bush and the Florida Cabinet signed a historic settlement agreement to eliminate the potential for oil drilling in State waters.

State Pipeline Infrastructure

The existing pipeline network in the Gulf Coast States is developed and extensive, with spare capacity. Expansion is projected to be primarily small diameter pipelines to increase the interconnectivity of the existing network and a few major interstate pipeline expansions. Pipeline companies are taking steps to reduce impacts from future hurricanes by adding new interconnections to their pipeline networks to create alternate routes in case of damage to one part of the network (Federal Trade Commission, 2006). Any new larger diameter pipelines would likely be constructed to support onshore and offshore LNG terminals. However, as discussed in Chapter 4.1.3.2.6 of the Multisale EIS, there is spare capacity in the existing pipeline infrastructure to move the regasified natural gas to market, and deepwater ports can serve onshore facilities, including intrastate as well as interstate pipelines.

3.3.3. Other Major Offshore Activities

Dredged Material Disposal

Chapter 4.1.3.2.1 of the Multisale EIS discusses in detail disposal of dredged material. Dredged material is described at 33 CFR 324 as any material excavated or dredged from navigable waters of the U.S. Virtually all ocean dumping occurring today is dredged material, sediments removed from the bottom of waterbodies in order to maintain navigation channels and berthing areas. The USEPA, COE, and other interested parties are working to identify appropriate uses for dredged material rather than disposing of the material offshore. These uses may include beach nourishment or wetland habitat development.

Non-energy Minerals Program in the Gulf of Mexico

Chapter 4.1.3.2.2 of the Multisale EIS discusses in detail MMS's Marine Minerals Program, which provides policy direction for the development of marine mineral resources on the OCS. The Program continues to focus on identifying sand resources for coastal restoration, investigating the environmental implications of using those resources, and processing noncompetitive use requests.

Numerous restoration projects have used sand resources from borrow areas on the OCS that were identified by the highly successful MMS-State cooperative offshore sand program that was in place from the mid 1990's to 2005. Sand deposits identified and evaluated by the cooperative program have been used for three beach nourishment projects in Maryland, five projects in Virginia, and four in Florida. Sand sources identified through the MMS cooperative effort with Louisiana will likely serve as the major source of material for the restoration of the entire barrier island chain located in the southwestern and central Louisiana coastal area, identified in the Louisiana Coastal Area Ecosystem Restoration Plan. Although funding to continue the MMS-State cooperative program has been discontinued, MMS did receive earmark funds in 2005 to conduct offshore sand studies in support of coastal restoration efforts in the Gulf Coast States of Louisiana, Texas, Alabama, and Mississippi. The funds are currently being used to investigate available sources of OCS sand for the restoration of portions of coastal areas that were damaged by Hurricanes Katrina and Rita. The Louisiana Dept. of Natural Resources (LADNR) and Louisiana State University (LSU) are undertaking a joint effort to identify potential sand resources in the Trinity and Tiger Shoal complex, located in the Vermilion and South Marsh Island lease areas. Meanwhile, the General Lands Office in Texas is collecting new geologic and geophysical data to describe potential resources in buried Pleistocene Sabine and Colorado River paleochannels, located offshore Jefferson and Brazoria Counties.

The OCS sand and gravel resources must be wisely managed to ensure that environmental damage to the marine and coastal environments is minimized, mitigated, or does not occur. The MMS has focused on integrating the collected sand resource data with environmental studies to provide needed environmental information to make decisions regarding the use of OCS sand for future coastal restoration activities. A number of projects are in progress with the State of Louisiana and LSU to examine the long-term effects of dredging sand on Ship Shoal, a large potential borrow area offshore central Louisiana, as well as on Trinity and Tiger Shoals and Sabine Bank, along the central and west coasts of Louisiana. The State, LSU, and MMS are also cooperating to provide real-time wind, wave, and current data in support of numerical modeling exercises to determine the physical effects of dredging offshore, as well as providing invaluable information for actual dredging operations.

Since the dredging of OCS sand and the associated activities of oceangoing dredge vessels could present some use conflicts on blocks also leased for oil and/gas extraction, MMS initiated a regional offshore sand management program in Louisiana in 2003, which over the course of 4 years and several meetings has developed options and recommendations for an orderly process to manage OCS sand resources in areas of competing use. The Louisiana Sand Management Working Group is currently assisting MMS in developing guidelines for sand resource allocations, maintaining a master schedule of potential sand dredging projects, developing procedures for accessing sand under emergency conditions, and establishing environmental requirements for the use of offshore borrow areas.

To date, two sand leases have been issued (and subsequently terminated) in the CPA (i.e., the Sabine Pass/West Cameron areas, offshore Holly Beach, Cameron Parish, Louisiana; and the South Pelto area, offshore Terrebonne Parish, Louisiana), whereas none have been issued in the WPA. The Holly Beach lease provided 4.2 million yd^3 of OCS sand from Sabine Bank and the buried Peveto paleochannel. The MMS is negotiating an agreement with NOAA and the State of Louisiana for a major coastal and wetlands restoration project at Pelican Island in Plaquemines Parish, Louisiana. The negotiated agreement is expected to be finalized and issued in early the spring of 2008. The project involves the use of approximately 5,500,000 yd^3 of OCS sand from the buried Sandy Point paleochannels (West Delta Area) in a planned shoreline stabilization and marsh creation project, authorized under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). The project, at a total cost of $60 million, is the largest funded CWPPRA project to date and will create 800 ac (1.25 mi^2) of beach and marsh habitat that will help protect Louisiana's coastal communities and infrastructure from the devastating effects of wind, waves, and flooding. The project is of exceptionally high importance and priority to the State of Louisiana and has had major support from both Governor Jindal and Senator Landrieu.

Marine Transportation

Chapter 4.1.3.2.3 of the Multisale EIS discusses the extensive maritime industry that exists in the northern Gulf of Mexico. Marine transportation within the analysis area should grow linearly based on historical freight traffic statistics given current conditions. The estimated number of vessel trips that would occur as a result of a proposed action is presented in **Tables 3-2 and 3-3**. Because this would represent a small percentage of marine transportation in the Gulf of Mexico, marine transportation is not expected to significantly change as a result of a CPA or WPA proposed action.

Military Activities

Chapter 4.1.3.2.4 discusses in detail the extensive use of the offshore Gulf of Mexico for military activities. The air space over the Central and Western Gulf of Mexico is used by the Department of Defense (DOD) for conducting various air-to-air and air-to-surface operations. Nine military warning areas and five EWTA are located within the Gulf (**Figure 2-2**). The 181 South Area is located within two EWTA's. These warning and water test areas are multiple-use areas where military operations and oil and gas development have coexisted without conflict for many years. Based on that past experience, several military stipulations are planned for leases issued within identified military areas. All of the available CPA acreage identified for leasing consideration is west of the critical military mission zone of Eglin Air Force Base (i.e., a zone to the west of 86˚41' W. longitude) (**Figure 2-2**).

Artificial Reefs and Rigs-to-Reefs Development

Chapter 4.1.3.2.5 and Appendix A.4 of the Multisale EIS discusses in detail artificial reefs and rigs-to-reefs development in the Gulf of Mexico. Artificial reefs have been used along the coastline of the U.S. since the early 19th century. Stone (1974) documented that the use of obsolete materials to create artificial reefs has provided valuable habitat for numerous species of fish in areas devoid of natural hard bottom. Stone et al. (1979) found reefs in marine waters not only attract fish, but in some instances also enhance the production of fish. All of the five Gulf Coast States—Texas, Louisiana, Mississippi, Alabama, and Florida—have artificial reef programs and plans.

All OCS platforms have the potential to serve as artificial reefs. Offshore oil and gas platforms began providing artificial reef substrate in the Gulf of Mexico with the first platform installation in 1942. Historically, approximately 9 percent of the platforms decommissioned in the Gulf OCS have become used in the Rigs-to-Reefs (RTR) program. It is anticipated that approximately 10 percent of platforms installed as a result of a proposed action would become an RTR after decommissioning. For the OCS Program over the next 40 years, projections are that about twice as many platforms will be removed than those installed. This factor is prompting increased public attention on the ecologic value of oil and gas structures for their reef effects. Ongoing studies aim at evaluating the ecology of offshore structures and may lead to a greater emphasis on creation of artificial reefs through the RTR program.

Some of the 113 platforms destroyed by Hurricanes Katrina and Rita have been accepted into the RTR program. Louisiana has created numerous "Special Artificial Reef Sites" that use downed platforms. Due to the extreme water depths of the 181 South Area, it is not anticipated that any platforms installed in the 181 South Area would become RTR's.

Offshore Liquefied Natural Gas Projects

Chapter 4.1.3.2.6 of the Multisale EIS discusses in detail offshore liquefied natural gas (LNG) terminals projected, approved, and existing in the Gulf of Mexico. At present in the Gulf of Mexico, the only existing offshore LNG terminal is Gulf Gateway Energy Bridge located approximately 116 mi (187 km) offshore Louisiana. There have been an additional three licenses issued, three applications are under review, and three applications have been withdrawn or closed (USDOT, MARAD, 2008).

3.3.4. Other Major Influencing Factors on Coastal Environments

Submergence of Wetlands

Chapter 4.1.3.3.1 of the Multisale EIS discusses in detail the submergence of wetlands. Other major factors contributing to submergence of wetlands along the Gulf Coast are eustatic sea-level rise and land subsidence. Eustatic sea-level rise is caused by the reduction of the volume of water stored in the polar ice caps and expansion of ocean waters because of global warming. Land subsidence is caused by a variety of localized natural and manmade events such as down-warping or horizontal movement of the earth's crust; weighted surface compression; oxidation, consolidation, settling, and dewatering of surface sediments; and depressurization of subsurface reservoirs during oil and gas production (Swanson and Thurlow, 1973; Morton, 2003; Morton et al., 2002). In localized areas, subsidence and sea-level rise can be offset by sedimentation, placement of dredged material, and peat formation.

During the past century, the rate of eustatic sea-level rise along the Louisiana coast was relatively constant at 2.3 mm/yr (0.9 in/yr or 23 cm/century), although the rate has varied from a sea-level decrease of 3 mm/yr (0.12 in/yr) to a maximum increase of 10 mm/yr (0.39 in/yr) over decade-long periods (Turner and Cahoon, 1988; Williams and Burkett, 2002). Submergence in the Gulf is occurring most rapidly along the Louisiana coast and more slowly in other coastal states. Depending on local geologic conditions, the subsidence rate varies across coastal Louisiana from 3 to over 10 mm/yr (0.12 to over 0.39 in/yr). One of the major factors causing greater submergence rates in Louisiana is reduced sedimentation, resulting from deltaic abandonment, flood control, and channelization of the Mississippi River. There is scientific consensus that sea-level rise will continue and is likely to increase into the next century. The Intergovernmental Panel on Climate Change (IPCC)'s currently estimates the global average sea level will rise between 0.6 and 2 ft (0.18 and 0.59 m) in the next century (IPCC, 2007).

Subsidence or sinking of the land surface in southern Louisiana and the entire south-central U.S. is mainly attributed to the weight of Mississippi River mud that makes up the geography of the region, drainage and oxidation of organic soils, natural compaction and dewatering of surficial sediments, and tectonic activity (geosynclinal downwarping and movement along growth faults). The problem is aggravated in Louisiana by flood protection measures and disruption of natural drainage ways that reduce sediment deposition to the Deltaic region. Fluid withdrawal, including groundwater withdrawals and oil and gas production, can cause localized subsidence in the aquifer system and above the producing reservoirs. In coastal Louisiana, about 400 km^2 (98,842 ac) of wetlands have a subsidence potential greater than 10 cm (4 in) because of fluid withdrawal (Turner and Cahoon, 1988). Morton (2002) used geodetic releveling surveys to identify historical subsidence rates of 9.4 mm/yr (0.62 in/yr) and averaging 6.4 mm/yr (0.25 in/yr) along Bayou Petit Caillou in Terrebonne Parish, Louisiana. The average subsidence rate for Terrebonne Parish over the last 5,000 years is calculated at <3 mm/year (0.12 in/yr) (Roberts et al., 1994). Thus, hydrocarbon production can induce local subsidence rates sufficient to result in significant landloss.

River Development and Flood Control Projects

Chapter 4.1.3.3.2 of the Multisale EIS discusses in detail river development and flood control projects.

In recent decades, alterations in the upstream hydrology of the rivers draining into the northern Gulf of Mexico have resulted in a variety of coastal impacts. Dams and reservoirs on upstream tributaries trap much of the sediment load in the rivers. The suspended sediment load of the Mississippi River has decreased nearly 60 percent since the 1950's, largely as a result of dam and reservoir construction upstream (Tuttle and Combe, 1981; Turner and Cahoon, 1988).

In a natural system, over-bank flooding introduces sediments into adjoining wetlands. Flood control on the Mississippi and other rivers has largely eliminated flood-borne sedimentation in the Gulf coastal wetlands, contributing to their deterioration.

Channelization of the Mississippi and other rivers in conjunction with flood control levees has also contributed to wetland loss and has interrupted wetland creation around the Gulf by preventing distribution of alluvial sediments across deltas and flood plains. Prior to channelization, the flow of rivers was distributed among several distributary channels that delivered sediment over a broad area during high river stages. Today, sediment from the Mississippi River is primarily discharged through the main channel directly to the deep waters of the continental slope. The only significant exception to this scenario is the diversion of approximately 30 percent of the Mississippi River flow to the Atchafalaya River; this diversion does not capture 30 percent of the sediment flow, however, since most of the sediment is restricted to the deeper river channel.

Dredging

Chapter 4.1.3.3.3 of the Multisale EIS discusses dredging in detail.

Dredging operations include sediment and gravel harvesting; pipeline installation; canal installation, maintenance, and modifications; harbor installation and maintenance; and stream channelization.

Numerous channels are maintained throughout the onshore cumulative activity area by Federal, State, county, commercial, and private interests. Proposals for new and maintenance dredging projects are reviewed by Federal, State, and county agencies as well as by private and commercial interests to identify and mitigate adverse impacts upon social, economic, and environmental resources.

Materials from maintenance dredging are primarily disposed within existing, confined, dredged-material disposal facilities. Additional dredged-material disposal areas for maintenance or new-project dredging are developed as needed and must be evaluated and permitted by COE and relevant State agencies prior to construction. Some dredged sediments are dispersed into offshore waters at established offshore disposal sites. Materials may also be used in a beneficial manner to restore and create habitat, beach nourishment projects, and industrial and commercial development.

Dredged materials from channels are often contaminated with toxic heavy metals, organic chemicals, pesticides, oil and grease, and other pollutants originating from municipal, industrial, and vessel discharges and nonpoint sources, and thus can result in contamination of areas formerly isolated from major anthropogenic sources (USEPA, 1979). The vicinities around harbors and industrial sites are most noted for this problem. Hence, sediment discharges from dredging operations can be major point sources of pollution in coastal waters in and around the Gulf. In addition, inland and shallow offshore disposal can change the navigability and natural flow or circulation of waterbodies.

In 1989, USEPA estimated that more than 90 percent of the volume of material dumped in the oceans around the U.S. consisted of sediments dredged from U.S. harbors and channels (USEPA, 1989). As of February 1997, in response to the Marine Protection, Research, and Sanctuaries Act of 1972, USEPA had finalized the designation of eight dredged-material disposal sites in the cumulative activity area. Another four sites in the Gulf are considered interim sites for dredged-material disposal. These sites primarily facilitate the COE's bar-channel dredging program. Generally, each bar channel of navigation channels connecting the Gulf and inland regions has 1-3 disposal sites used for disposal of maintenance dredged material. These are usually located in State waters. Some designated sites have never been used.

Installation and maintenance of any navigation channel and many pipeline canals connecting two or more waterbodies changes the hydrodynamics in their vicinity. These changes are typically associated with saltwater intrusion, reduced freshwater retention, changed circulation patterns, changed flow velocities, and erosion. When these channels are permitted for construction through sensitive wetland habitats or when sites are permitted for dredged-material disposal, measures are required to mitigate unavoidable adverse environmental impacts. Structures constructed to mitigate adverse hydrodynamic impacts and accelerated erosion includes dams, weirs, bulkheads, rip-rap, shell/gravel mats, and gobi mats.

Typically, little or no maintenance is performed on mitigation structures. Without maintenance, many mitigation facilities, particularly in regions where the soil is poorly consolidated and has a high organic content, are known to become ineffective within a few years of construction. The number of mitigation structures associated with navigation and pipeline channels is unknown.

3.3.5. Coastal Restoration

Chapter 4.1.3.3.4 of the Multisale EIS discusses coastal restoration efforts and funding by State.

The coastal infrastructure that supports State and OCS oil and gas activities would benefit from coastal restoration. Coastal erosion could have a significant negative impact on this coastal infrastructure, including pipelines, navigation channels, and supply bases (U.S. Dept. of the Army, COE, 2004c). The extensive pipelines traversing coastal Louisiana are affected by coastal erosion as barrier islands and coastal wetlands erode and as open water scours away land-protecting pipelines. Exposed pipelines, once buried, are at increased risk from failure or damage because of lack of structural stability, anchor dragging, and boat collisions. Navigation infrastructure is also already being impacted by coastal erosion as shown in three areas of the Gulf Intracoastal Waterway (GIWW). In those areas there is increased shoaling, causing traffic moving on the waterway to slow down, increasing the time and cost of moving commodities. Annual dredging maintenance cost has increased to keep the channel at authorized depths. Supply bases servicing offshore OCS oil and gas activities are also impacted by coastal erosion. These bases provide necessary supplies and maintenance services to the offshore platforms and serve as "jumping-off" points for employees that work on offshore platforms. If one of the important supply bases, such as Port Fourchon, was severely impacted by coastal degradation, the operational cost of offshore production could go up significantly.

In December 2007, the U.S. Government Accountability Office (GAO) published a report on lessons learned on coastal restoration in Louisiana (GAO, 2007). The GAO reviewed the CWPPRA program, and the following is a summary of its findings.

Over the next 50 years, Louisiana is projected to lose almost 17 mi^2 (10,880 ac) of coastline each year due to storms, sea-level rise, and land subsidence. Coastal wetlands are an important wildlife and commercial resource, and provide a natural buffer against the storm surge that accompanies storms and hurricanes. Recently, Congress made billions in new funding available over the next 20 years for coastal Louisiana.

Under CWPPRA, 147 projects have been designed and/or constructed to restore and protect over 120,000 ac (188 mi^2) of coastal wetlands (about 3% of the Louisiana coast). Projects have included large-scale efforts that reintroduce freshwater and sediment to declining wetlands, as well as smaller projects such as shoreline barriers and vegetation plantings to protect and restore the coastal landscape. As of June 2007, half have been completed. Costs can vary from about $9,000 per acre to plant marsh plants to almost $54,000 per acre to restore barrier islands. The estimated cost to complete all 147 projects was $1.78 billion. There are additional costs to maintain projects over their expected life spans, which, in most cases, is about 20 years.

The GAO identified the following issues that will need to be addressed as coastal restoration becomes larger and more complex:

- Increasing project costs can delay individual projects, as well as the overall program—currently 10 CWPPRA projects are on hold waiting for funds because estimated construction costs exceed funds available.
- Without an integrated monitoring system, officials cannot determine whether goals and objectives are being met—even after 4 years such a system is not fully implemented for CWPPRA.
- Identifying and addressing private landowner issues is critical in the project design phase—in some instances, these issues have led to costly project modifications or construction delays for some CWPPRA projects.
- Some projects simply fail to perform as designed due to landscape, structural, or other causes beyond the designers' control—some CWPPRA projects were terminated because such problems were not anticipated or could not be resolved.
- Storms and hurricanes can result in significant setbacks to projects—large areas of both naturally occurring and restored wetlands can be destroyed in just a few days if hit by a powerful storm.

3.3.6. Alternative Energy

Chapter 4.1.3.3.5 of the Multisale EIS discusses in detail alternative energy.

On August 8, 2005, President George W. Bush signed into law the Energy Policy Act of 2005 (the Act). Section 388 (a) of the Energy Policy Act of 2005 amended Section 8 of the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. 1337) to authorize DOI to grant leases, easements, or right-of-ways on the OCS for the development and support of energy resources other than oil and gas and to allow for alternate uses of existing structures on the OCS lands. The MMS is developing a comprehensive program and regulations to implement the new authority. As a part of this process, MMS has published an Advance Notice of Proposed Rulemaking (ANPR) in the *Federal Register* on December 30, 2005, and seeks comments on alternate energy-related uses on the OCS. In November 2007, MMS published the Final Programmatic Environmental Impact Statement for the OCS Alternative Energy and Alternate Use Program and the Request for Information and Nominations of Areas for Leases for Alternative Energy. The MMS published a Record of Decision on January 10, 2008. The Proposed Rule for Alternative Energy and Alternate Uses of Existing Facilities on the Outer Continental Shelf was published on July 9, 2008.

The MMS also announced an interim policy for the authorization of the installation of offshore data collection and technology testing facilities in Federal waters. More than 40 areas of interest were identified in response to the interim policy. In general, proposals for the installation of meteorological towers were received for areas off New Jersey, Delaware, and Georgia. Off California, proposals were received to install buoys to measure waves, while current measurements were proposed off the Southeast Florida coast.

Two wind farm projects are currently going through the permitting process in the U.S. The Cape Wind project is located on Horseshoe Shoal in Nantucket Sound, Massachusetts, and the Long Island Power Authority project is located off the south shore of Long Island, New York. Both projects were grandfathered in under the Energy Policy Act of 2005. The Cape Wind Energy Project developer, Cape Wind Associates (the applicant), proposes to build, operate, and eventually decommission an electric generation facility consisting of 130 wind turbine generators arranged in a grid pattern capable of a maximum electric output of 468 megawatts and an average output of 182.6 megawatts. The Cape Wind Energy Project proposes to interconnect with and deliver electricity to the New England Power Pool utilizing wind resources on the OCS. The MMS published a Notice of Availability on the Draft EIS on January 18, 2008, and anticipates completion of the Final EIS and Record of Decision in the fall of 2008.

The MMS is awaiting the official decision from the Long Island Power Authority on the disposition of the Long Island Offshore Wind Park project.

The wind resource potential of the Gulf of Mexico is not very well documented. Archer and Jacobson (2003) conducted a study of U.S. winds and wind power at 80 m (256 ft) height. Their study concluded that the Gulf of Mexico has a higher potential of wind resources than previously thought. These unexpected levels of wind velocity have led to interest in wind energy generation in the Gulf of Mexico.

On October 24, 2005, The Texas General Land Office (TGLO) announced authorization for the first offshore wind energy project in the United States to be built in State waters off the Texas coast. An 11,355-ac (4,595-ha) lease was awarded to Galveston-Offshore Wind, L.L.C., a subsidiary of Louisiana-based Wind Energy Systems Technologies (W.E.S.T.). The lease allows work to begin immediately on the construction of two meteorological towers to gather wind resource data to determine exactly where 50 wind turbines would be placed for the 150-megawatt development. The lease area is located approximately 7 mi (11 km) southeast of Galveston Island in Galveston Blocks 187 and 188. State waters in Texas, unlike the other states, extend 3 leagues (10.3 mi; 16.6 km) offshore. The TGLO announced in May 2006 that it reached an agreement with Superior Renewable Energy, L.L.C., granting the rights to 39,900 ac (16,147 ha) of submerged lands in the Gulf of Mexico, just off the coast of Padre Island and south of Baffin Bay. More than 100 wind turbines are expected to be built between 3 and 8 mi (5 and 13 km) offshore and will generate approximately 500 megawatts of capacity. In October 2007, the TGLO held a competitive auction for four additional offshore wind lease sites in State waters. The W.E.S.T. won the competition and was awarded the rights for these additional leases that would be developed after the Galveston project. The W.E.S.T. has agreed to a three-phase lease agreement for development of the Galveston lease area. During Phase 1, W.E.S.T. will build and operate two, 80-m (262-ft) tall meteorological towers designed to collect wind data in the Gulf of Mexico. Concurrently, studies of bird migration patterns will be done, and information required for State and Federal permits will be gathered.

Until MMS promulgates the regulations under which these projects will operate, MMS will accept no proposals for alternate energy development or for alternate uses of the existing oil and gas facilities located on the Federal OCS. Once MMS finalizes appropriate regulations, the demands for projects of this type are expected to grow on the OCS. Evaluation of meteorological data collected in Texas State waters would also tell us in the near future about the possibility of siting wind farms on the Gulf's OCS for generating electricity.

3.3.7. Natural Events and Processes

3.3.7.1. Physical Oceanography

A detailed description of physical oceanography can be found in Appendix A.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, incorporating new information found since publication of the Multisale EIS.

The Gulf of Mexico is a semi-enclosed, subtropical sea with an area of approximately 1.5 million km^2 (about 600,000 mi^2). The main physiographic regions of the Gulf Basin are the continental shelf (including the Campeche, Mexican, and U.S. shelves), continental slopes and associated canyons, abyssal plains, the Yucatan Channel, and Florida Straits. The depth of the central abyss ranges to approximately 3,700 m (12,139 ft). The water volume of the entire Gulf is 2.3 million km^3 (over 0.5 million mi^3).

Gulf of Mexico physical oceanographic processes include the Loop Current (LC), Loop Current Eddies (LCE's), Topographic Rossby Waves (TRW's), and vortex-like and wave-like features underneath the LC and LCE's that interact with bottom topography. Infrequently observed processes include a limited number of high-speed current events, at times approaching 100 cm/s (39 in/s), were observed at depths exceeding 1,500 m (4,921 ft) in the northern Gulf of Mexico (Hamilton and Lugo-Fernandez, 2001; Hamilton et al., 2003), and very high-speed currents in the upper portions of the water column observed in deep water by several oil and gas operators. All of these processes are described in the Multisale EIS (USDOI, MMS, 2007b). Generally, current speed in the deepwater Gulf of Mexico has been observed to decrease with depth. Mean deep flow around the edges of the Gulf of Mexico circulates in a cyclonic (counterclockwise) direction at ~2,000 m (6,562 ft) (Sturges et al., 2004) and at ~900 m (2,953 ft) (Weatherly, 2004).

Mean seasonal circulation patterns of inner-shelf and outer-shelf currents on the Louisiana-Texas continental shelf, the northeastern Gulf of Mexico shelf, and the West Florida shelf are described in Appendix A.2 of the Multisale EIS. These currents are primarily wind driven and also influenced by riverine outflow. Cold water from deeper offshelf regions moves onto and off the continental shelf by cross-shelf flow associated with upwelling and downwelling processes in some locations (Collard and Lugo-Fernandez, 1999). Wind events such as tropical cyclones (especially hurricanes), extratropical cyclones, and cold-air outbreaks can result in extreme waves and cause currents with speeds of 100-150 cm/s (39-59 in/s) over continental shelves. Waves as high as 91 ft (28 m) were measured under Hurricane Ivan (Wang et al., 2005).

General Gulf of Mexico physical oceanography is discussed further and at greater length in Appendix A.2 of the Multisale EIS.

Although physical oceanography of the 181 South Area is consistent with that of adjacent Gulf of Mexico regions, it was not specifically covered in the Multisale EIS. Circulation in the 181 South Area and adjacent regions is highly influenced by the Loop Current, a circulatory feature of the southeastern Gulf of Mexico. Spatial frequency of the LC water mass throughout the Gulf of Mexico is illustrated in **Figure 3-13**. In the 181 South Area, spatial frequency of the LC water mass ranges from 20 to 70 percent (Vukovich, 2005), and when the LC is in this area, it is the dominant circulatory feature. Loop Current domination of circulation in the 181 South Area has been observed in surface and deep drifter data (Weatherly, 2004; Sturges et al., 2001). Preliminary mooring results from the Eastern Gulf of Mexico Circulation Study that is being conducted by Evans-Hamilton for MMS agree, and observational data collected for this study in 2006-2007 show multiple incidents of currents being affected by the Loop Current, LCE's, or passing storms in the area. Loop Current or LCE intrusions generated the strongest upper layer currents. The Loop Current or LCE generated currents also penetrated deeper into the water column than storm-induced currents (Cox, 2008).

3.3.7.2. Hurricanes

Cycles in tropical climate patterns near the equator typically last several decades (20-30 years or even longer) (USDOC, NOAA, 2005). As a result, the North Atlantic experiences alternating periods (20-30 years or even longer) of above-normal or below-normal hurricane seasons. There is a two- to three-fold increase in hurricane activity during eras of above-normal activity. It is assumed hurricane activity from 1995 to 2007 is representative of an era of above-normal hurricane activity.

During the 1995-2007 hurricane seasons, 12 hurricanes passed through either the CPA or WPA, disrupting OCS oil and gas activity in the Gulf of Mexico. This is an average of about one hurricane per year. Half of these hurricanes reached a maximum strength of Category 1 or 2 while in the CPA or WPA, while the other half were powerful hurricanes reaching maximum strengths of Categories 4 or 5. During this 13-year period, 14 hurricanes made landfall along the Gulf Coast from Texas through the Florida Panhandle. Five of these hurricanes made landfall in Louisiana.

The current era of heightened Atlantic hurricane activity began in 1995; therefore, the Gulf of Mexico could expect to see a continuation of above-normal hurricane activity during the first quarter to half of the 40-year analysis period and below-normal activity during the remaining half to three-quarters of the 40-year analysis period.

CHAPTER 4

ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES

4. ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES

The impacts of 11 CPA and WPA sales were analyzed in the *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* (USDOI, MMS, 2007b). The Final EIS is hereby incorporated by reference as the Multisale EIS.

An analysis of the routine, accidental, and cumulative impacts of a CPA or WPA proposed action on environmental and socioeconomic resources of the Gulf of Mexico can be found in Chapters 4.2, 4.4, and 4.5 of the Multisale EIS, respectively. The MMS has reexamined those analyses based on the additional information available since the publication of the Multisale EIS and the addition of the 181 South Area to the proposed CPA sale area. The results of this reexamination are presented in the following chapters.

4.1. ALTERNATIVE A—THE PROPOSED ACTIONS

4.1.1. Air Quality

The MMS has reexamined the analysis for air quality presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for air quality presented in the Multisale EIS. Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, routine activities occurring in the area are expected to have minimal impact on onshore air quality. However, there may be temporary and localized impacts to offshore air quality from activity within the 181 South Area. In addition, no additional large spills or blowouts are projected as a result of the addition of the 181 South Area.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Emissions of pollutants into the atmosphere from the routine activities associated with the proposed actions in the CPA or WPA 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 NAAQS. 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 a proposed action are not expected to have concentrations that would change onshore air quality classifications. The total impact from all onshore and offshore emissions (such as roads, power generation, and industrial activities) would continue to significantly affect the ozone nonattainment areas in southeast Texas and the parishes near Baton Rouge, Louisiana. A proposed action would have an insignificant contribution to ozone levels in the nonattainment areas and would not interfere with the States' schedule for compliance with the NAAQS.

4.1.1.1. Description of the Affected Environment

The detailed description of air quality in the Gulf of Mexico can be found in Chapter 3.1.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

The Clean Air Act (CAA) established the NAAQS; the primary standards are to protect public health and the secondary standards are to protect public welfare, as shown in **Table 4-1**. Effective December 17, 2006, USEPA revoked the annual PM_{10} standard of the current 50 μg/m^3 and revised the 24-hr $PM_{2.5}$ from the current level of 65 μg/m^3 to 35 μg/m^3. The Clean Air Act Amendments of 1990 (CAAA) established classification designations based on regional monitored levels of ambient air quality.

Attainment

When measured concentrations of regulated pollutants exceed standards established by the NAAQS, an area may be designated as a nonattainment area for a regulated pollutant.

The Federal OCS waters' attainment status is unclassified because there is no provision in the CAA for waters outside the seaward boundaries of State waters. Only areas within State boundaries are to be classified either attainment, nonattainment, or unclassifiable. Operations west of 87º30' W. longitude fall under MMS jurisdiction for enforcement of the Clean Air Act. The OCS waters east of 87º30' W. longitude are under the jurisdiction of USEPA.

Gulf Coast States' attainment status for criteria pollutants (i.e., carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), particulate matter (PM), and ozone (O_3)) is described in the Multisale EIS and has not changed (USEPA, 2007a). Gulf Coast States are in attainment for criteria pollutants except for 11 Texas coastal counties and 5 Louisiana coastal parishes that are in nonattainment for ozone (USEPA, 2007a).

On March 12, 2008, USEPA promulgated a new ozone standard of 75 parts per billion (ppb). The USEPA will issue final designations of attainment, nonattainment, and unclassifiable areas no later than March 2010 unless there is insufficient information to make these designation decisions. In that case, USEPA will issue designations no later than March 2011. The revised standard may result in additional Gulf Coast counties being designated nonattainment for ozone. The MMS is conducting a study to investigate the ozone impacts with respect to the new 8-hour O_3.

Emission Inventories

The CAAA requires MMS to coordinate air-pollution control activities with USEPA. Thus, there will be a continuing need for emission inventories and modeling in the future. The following is summary of new information available since publication of the Multisale EIS.

The MMS has completed two air emissions inventory studies for calendar years 2000 (Wilson et al., 2004) and 2005 (Wilson et al., 2007). These studies estimated emissions for all OCS oil and gas production-related sources in the Gulf of Mexico, including non-platform sources, as well as other non-OCS-related emissions. The inventories included carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), particulate matter-10 (PM_{10}), $PM_{2.5}$, and volatile organic compounds (VOC's); as well as greenhouse gases—carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). The widespread damage in the Gulf of Mexico caused by Hurricanes Katrina and Rita impacted the inventory results for September through December 2005. Due to the impacts of the hurricanes on OCS facilities in 2005, an updated Gulfwide emissions inventory study is ongoing for calendar year 2008, and more inventory data have been collected. These emissions inventories will be used in air quality modeling to determine potential impacts of offshore sources to onshore areas.

The USEPA has implemented the new ozone standard of 75 ppb in 2008. In response to this new ozone standard, MMS is conducting a new study to investigate the ozone impacts with respect to the new 8-hour O_3. Additional Gulf Coast counties/parishes may become nonattainment for ozone, which would likely generate renewed interest in OCS sources to mitigate the OCS contribution to ozone nonattainment areas. In turn, this would likely require MMS to conduct additional air quality studies to more accurately determine the OCS contribution.

4.1.1.2. Impacts of Routine Events

Background/Introduction

A detailed description of the possible impacts from the routine activities associated with a CPA or WPA proposed action on air quality can be found in Chapters 4.2.2.1.1 and 4.2.1.1.1 of the Multisale EIS, respectively.

The routine activities associated with the proposed action in the CPA or WPA that would potentially affect air quality include 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 from surface oil slicks, and fugitive emissions.

CPA Proposed Action Analysis

The use of FPSO's and tankering are projected for a CPA proposed action. Up to 0.49 billion barrels (Bbbl), or 37 percent, of oil production is projected to be transported by tankers as a result of a proposed action in the CPA. The MMS released a Final EIS on the potential use of FPSO's in February 2001 (USDOI, MMS, 2001b). The FPSO EIS concluded emissions from routine operations associated with FPSO's and tankering may result in a long-term, significant impact on air quality at Breton Sound Wilderness Area (NWA) due to potential exceedances of the Prevention of Significant Deterioration (PSD) Class I incremental limit for SO_2. However, if there is reason to believe that installation of an FPSO would adversely affect the Breton NWA, an air quality analysis will be conducted and mitigation imposed, if needed, to meet the PSD Class I standards. The installation of up to five geographically dispersed FPSO's may adversely affect air quality, depending upon the location and proximity to shore and one another. In the unlikely event that several FPSO's would be placed such that they could affect air quality in the Breton NWA, a PSD Class I area, potential air quality impacts are expected from SO_2 emissions may have to be mitigated. The flaring/venting operations associated with gas disposal could also have significant impacts on air quality depending upon the volume of gas emitted and sulfur content. Flaring of gas would mitigate almost all of the VOC emissions, but it would result in emisisons of NO_x and SO_2. The SO_2 emissions can be mitigated through a sulfur recovery unit. However, most gas resources in the Gulf do not have high sulfur content.

The number of service-vessel round trips projected for a CPA proposed action is 114,000-241,000 trips over the lifetime of a proposed action. Based on current service base usage, it is assumed the majority of these trips would occur in Louisiana's coastal waters. Impacts to onshore air quality should be minimal according to the Offshore and Coastal Dispersion (OCD) modeling results.

Up to one new gas processing plant is projected as a result of a proposed action. In addition, a proposed action would contribute to the use of existing onshore facilities in Louisiana, Mississippi, and Alabama. These supporting onshore facilities would emit air pollutants into the air. However, these point-source emissions would be regulated by USEPA or the USEPA-authorized State agency, which would require point-source emissions to meet criteria prior to discharge of air pollutants into the atmosphere. These direct impacts would be minimal if all existing regulatory requirements are met.

Portions of the Gulf Coast have ozone levels that exceed the Federal air quality standard, but the contribution from proposed activities is very small. Ozone levels are on a declining trend because of air pollution control measures that have been implemented by States. This downward trend is expected to continue as a result of local as well as nationwide air pollution control efforts. A proposed action would have only a small effect on ozone levels in ozone nonattainment areas and would not interfere with the States' schedule for compliance with the NAAQS.

The flaring of natural gas containing hydrogen sulfide (H_2S) and the burning of liquid hydrocarbons containing sulfur (Chapter 4.1.1.9 of the Multisale EIS) result in the formation of SO_2. Flaring of sour gas is of concern because it could significantly impact onshore areas, particularly when considering the short-duration averaging periods (3 and 24 hr) for SO_2. To prevent inadvertently exceeding established criteria for SO_2 for the 3-hr and 24-hr averaging periods, all incinerating events involving H_2S or liquid hydrocarbons are evaluated individually during the postlease process.

The OCD modeling results show that increases in onshore annual average concentrations of NO_x, SO_2, and PM_{10} are estimated to be less than the maximum increases allowed in the PSD Class II Areas.

Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, routine activities occurring in the area are expected to have minimal impact on onshore air quality. However, there may be temporary and localized impacts to offshore air quality from activity within the 181 South Area.

WPA Proposed Action Analysis

The use of FPSO's and tankering are projected for a WPA proposed action. Up to 0.25 Bbbl, or 59 percent, of oil production is projected to be transported by tankers as a result of a proposed action in the WPA. The installation of up to five geographically dispersed FPSO's may adversely affect air quality, depending upon the location and proximity to shore and one another. The flaring/venting options for gas disposal could also have significant impacts on air quality. Air quality impacts would be mitigated so as to prevent adverse impacts to onshore areas.

Service-vessel round trips projected for a WPA proposed action are 94,000-155,000 trips over the life of a proposed action. Based on current service base usage, it is assumed the majority of these trips would occur in Louisiana's coastal waters. Impacts on onshore air quality should be minimal according to the OCD modeling results.

Up to one new gas processing plant is projected as a result of a WPA proposed action. In addition, a WPA proposed action would contribute to the use of existing onshore facilities in Texas, Louisiana, and Mississippi. These supporting onshore facilities would emit air pollutants into the air. However, these point-source emissions would be regulated by USEPA or the USEPA-authorized State agency, which would require point-source emissions to meet criteria prior to discharge of air pollutants into the atmosphere. These direct impacts would be minimal if all existing regulatory requirements are met.

Portions of the Gulf Coast have ozone levels that exceed the Federal air quality standard, but the contribution from proposed activities is very small. Ozone levels are on a declining trend because of air pollution control measures that have been implemented by States. This downward trend is expected to continue as a result of local as well as nationwide air pollution control efforts. A WPA proposed action would have only a small effect on ozone levels in ozone nonattainment areas and would not interfere with the States' schedule for compliance with the NAAQS.

The flaring of natural gas containing H_2S and the burning of liquid hydrocarbons containing sulfur (Chapter 4.1.1.9 of the Multisale EIS) result in the formation of SO_2. Flaring of sour gas is of concern because it could significantly impact onshore areas, particularly when considering the short-duration averaging periods (3 and 24 hr) for SO_2. To prevent inadvertently exceeding established criteria for SO_2 for the 3-hr and 24-hr averaging periods, all incinerating events involving H_2S or liquid hydrocarbons are evaluated individually during the postlease process.

The OCD modeling results show that increases in onshore annual average concentrations of NO_x, SO_2, and PM_{10} are estimated to be less than the maximum increases allowed in the PSD Class II Areas.

Summary and Conclusion

Emissions of pollutants into the atmosphere from the routine activities associated with the proposed actions in the CPA or WPA 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 are expected to be well within the NAAQS. A proposed action would have only a small effect on ozone levels in ozone nonattainment areas and would not interfere with the States' schedule for compliance with the NAAQS. The OCD modeling results show that increases in onshore annual average concentrations of NO_x, SO_x, and PM_{10} are estimated to be less than the maximum increases allowed in the PSD Class II Areas.

The CALPUFF modeling results also indicate that all concentrations are below the maximum allowable PSD increments, except for 24-hr SO_2 and annual NO_2 for the Class I Area. The impacts from the proposed actions are well within the PSD Class I allowable increment.

Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, the area is expected to have minimal impact on onshore air quality. A relatively minor amount of additional activity is projected; therefore, no additional impacts on offshore air quality are projected as a result of the inclusion of the 181 South Area.

The MMS has reexamined the analysis for air quality presented in the Multisale EIS based on the additional information presented above and ongoing studies. No significant new information was found that would alter the overall conclusion that impacts on air quality from routine activities associated with a CPA or WPA proposed action would be minimal.

4.1.1.3. Impacts of Accidental Events

Background/Introduction

The accidental release of hydrocarbons or chemicals from a proposed action in the CPA or WPA would cause the emission of air pollutants. The accidents from oil and gas operations might involve oil spills, well blowouts, and burning of an oil spill. The pollutants considered here are NO_2, CO, sulphur oxides (SO_x), VOC's, PM_{10}, and $PM_{2.5}$. The pollutant concentration levels are dependent on the atmospheric conditions.

If the accidental release from blowouts involves high concentrations of H_2S, it could result in deaths as well as environmental damage. While encounters with H_2S during oil and gas operations have caused injury and death throughout the U.S., none, to date, have occurred in the GOM region. The H_2S concentrations in the OCS vary from as low as a fraction ppm to as high as 650,000 ppm. The concentrations of H_2S found to date are generally greatest in the eastern portion of the CPA. The Occupational Safety and Health Administration's permissible exposure limit for H_2S is 20 ppm, which is 30 times lower than the "immediately dangerous to life and health" of 100 ppm set by the National Institute for Occupational Safety and Health. At about 500-700 ppm, loss of consciousness and possible death can occur in 30-50 minutes. H_2S is a toxic gas; at lower concentrations, it is readily recognized by the "rotten egg" smell.

The following information is a summary of the impact analysis incorporated by reference from Chapter 4.4.1 of the Multisale EIS.

CPA Proposed Action Analysis

The accidental release of hydrocarbons or chemicals from a CPA proposed action would cause the emission of air pollutants. Some of these pollutants are precursors to ozone, which is formed by complex photochemical reactions in the atmosphere. Accidents, such as oil spills and blowouts, are a source of emissions related to OCS operations. Typical emissions from OCS accidents consist of hydrocarbons; only fires produce a broad array of pollutants, including all NAAQS-regulated primary pollutants. The criteria pollutants considered here are NO_2, CO, SO_x, VOC, PM_{10}, and $PM_{2.5}$.

Oil from the 181 South Area will likely be heavier oil than oil typically found in shallow water. Heavier oil is more likely to emulsify; therefore, the contribution of oil-spill emissions to the total VOC emission would be smaller than the emission given in the Multisale EIS, about 0.5 percent or less.

In-situ burning of a spill results in emissions of NO_2, SO_2, CO, and PM_{10}, and would generate a plume of black smoke. However, it was found that during the burn, CO, SO_2, and NO_2 were measured only at background levels and were frequently below detection levels (Fingas et al., 1995). The impacts from in-situ burning are temporary. Pollutant concentrations would be expected to be within the NAAQS. The air quality impacts from in-situ burning would therefore be minor.

It has been estimated that 2-3 blowouts could occur from activities resulting from a proposed action. An additional 9-12 wells per proposed CPA sale are projected to be drilled as a result of the addition of the 181 South Area. Based on the blowout rate of 6 per 1,000 well starts, no additional blowouts are projected as a result of the addition of the 181 South Area. H_2S is a toxic gas, and accidents involving high concentrations of H_2S from blowouts could result in deaths as well as environmental damage.

WPA Proposed Action Analysis

The accidental release of hydrocarbons or chemicals from a WPA proposed action would cause the emission of air pollutants. Some of these pollutants are precursors to ozone, which is formed by complex photochemical reactions in the atmosphere. Accidents, such as oil spills and blowouts, are a source of emissions related to OCS operations. Typical emissions from OCS accidents consist of hydrocarbons; only fires produce a broad array of pollutants, including all NAAQS-regulated primary pollutants. The criteria pollutants considered here are NO_2, CO, SO_x, VOC, PM_{10}, and $PM_{2.5}$.

In-situ burning of a spill results in emissions of NO_2, SO_2, CO, and PM_{10}, and would generate a plume of black smoke. However, it was found that during the burn, CO, SO_2, and NO_2 were measured only at background levels and were frequently below detection levels (Fingas et al., 1995). The impacts from in-situ burning are temporary. Pollutant concentrations would be expected to be within the NAAQS. The air quality impacts from in-situ burning would therefore be minor.

It has been estimated that 1-2 blowouts could occur from activities resulting from a WPA proposed action. H_2S is a toxic gas, and accidents involving high concentrations of H_2S from blowouts could result in deaths as well as environmental damage.

Summary and Conclusion

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. Other emissions of pollutants into the atmosphere from accidental events as a result of a CPA or 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. These emissions are not expected to have concentrations that would change onshore air quality classifications.

The addition of the 181 South Area would not significantly increase the risk of impacts to air quality from accidental events. No additional blowouts are projected as a result of the addition of the 181 South Area. Heavier oil from the 181 South Area is more likely to emulsify; therefore, the contribution of oil-spill emissions to the total VOC emission would be smaller than the emission given in the Multisale EIS, about 0.5 percent or less.

4.1.1.4. Cumulative Impacts

Background/Introduction

A detailed description of cumulative impacts on air quality can be found in Chapter 4.5.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS. This cumulative analysis summary considers OCS and non-OCS activities that could occur and adversely affect onshore air quality and Breton National Wilderness Area from OCS sources during the 40-year analysis period.

The activities for the OCS Program include the exploration, delineation, and development wells; platform installation; and service-vessel trips. Emissions of pollutants into the atmosphere from the activities associated with the OCS Program are not projected to have significant effects on onshore air quality because of the prevailing atmospheric conditions, emission rates and heights, and the resulting pollutant concentrations. Onshore impacts on air quality from emissions from OCS activities are estimated to be within PSD Class II allowable increments. In a recent study, the modeling results indicate that the cumulative impacts to the Breton Wilderness Class I Area are well within the PSD Class I allowable increment (Wheeler et al., in preparation). The OCS contribution to the air quality problem in the coastal areas is small, but the total impact from onshore and offshore emissions would be significant to the ozone nonattainment areas in southeast Texas and the parishes near Baton Rouge, Louisiana.

Other onshore emission sources include power generation, industrial processing, manufacturing, refineries, commercial and home heating, and motor vehicles.

Impacts from oil spills for the cumulative case would be similar to those for the proposed 2007-2012 leasing program. Impacts from individual spills would be localized and temporary.

Portions of the Gulf Coast have ozone levels that exceed the Federal air quality standard. 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.

Summary and Conclusion

Emissions of pollutants into the atmosphere from the activities associated with the OCS Program are not projected to have significant effects on onshore air quality because of the prevailing atmospheric conditions, emission rates and heights, and the resulting pollutant concentrations. Onshore impacts on air quality from emissions from OCS activities are estimated to be within Class II PSD allowable increments. The modeling results indicate that the cumulative impacts to the Breton Wilderness Class I Area are well within the PSD Class I allowable increment (Wheeler et al., in preparation).

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.

The incremental contribution of the proposed actions (as analyzed in Chapters 4.2.1.1.1 and 4.2.2.1.1 of the Multisale EIS) to the cumulative impacts is not significant and is not expected to alter onshore air quality classifications. Portions of the Gulf Coast have ozone levels that exceed the Federal air quality standard, but the incremental contribution from the proposed actions are very small. The cumulative contribution to visibility impairment from a proposed action is also expected to remain very small. A proposed action, including the 181 South Area, 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.

4.1.2. Water Quality

For the purposes of this SEIS, water quality is the ability of a waterbody to maintain the ecosystems it supports or influences. In the case of coastal and marine environments, the quality of the water is influenced by the rivers that drain into the area, the quantity and composition of wet and dry atmospheric deposition, and the influx of constituents from sediments. Besides the natural inputs, human activity can contribute to diminished water quality through discharges, run-off, dumping, air emissions, burning, and spills. Also, mixing or circulation of the water can either improve the water through flushing or be the source of factors contributing to the decline of water quality.

Evaluation of water quality is done by the measurement of factors that are considered important to the health of an ecosystem. The primary factors influencing coastal and marine environments are temperature, salinity, dissolved oxygen, nutrients, potential of hydrogen (pH), oxidation reduction potential (Eh), pathogens, and turbidity or suspended load. Trace constituents such as metals and organic compounds can affect water quality. The water quality and sediment quality may be closely linked. Contaminants, which are associated with the suspended load, may ultimately reside in the sediments rather than the water column.

The region under consideration is divided into coastal and marine waters for the following discussion. Coastal waters, as defined by MMS, include all the bays and estuaries from the Rio Grande River to the Florida Bay (**Figure 4-1**). Marine water as defined in this document includes both State offshore water and Federal OCS waters, which includes everything outside any barrier islands to the Exclusive Economic Zone. The inland extent is defined by the Coastal Zone Management Act.

The MMS has reexamined the analysis for water quality presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for water quality presented in the Multisale EIS. The 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity; therefore, no additional impacts on water quality are projected as a result of the inclusion of the 181 South Area.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Impacts from routine activities associated with a proposed action 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. Marine 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 m (328 ft) adjacent to the point of discharge. Structure installation and removal and pipeline placement disturbs the sediments and causes increased turbidity. In addition, marine water impacts result from supply and service-vessel bilge and ballast water discharges.

Smaller spills (<1,000 bbl) are not expected to significantly impact water quality in coastal or marine waters. Larger spills, however, could impact water quality in coastal waters. Accidental chemical spills, release of SBF, and blowouts would have temporary localized impacts on water quality.

The activity associated with a proposed action would contribute a small percentage of the existing and future OCS energy industry. The specific discharges, drill muds, cuttings and produced water and accidents resulting in spills would occur in proportion to production and, therefore, add a small increase to the anticipated impacts. Furthermore, the vessel traffic and related discharges associated with a proposed action are a fraction of the ongoing commercial shipping and military activity in the Gulf. The impacts of discharges, sediment disturbances, and accidental releases are a small percentage of the overall activity and the overall impacts to coastal and marine waters.

4.1.2.1. Coastal Waters

4.1.2.1.1. Description of the Affected Environment

A detailed description of water quality in coastal marine waters can be found in Chapter 3.1.2.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS. Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, the area is not applicable to this coastal water quality discussion.

Along the Gulf Coast lies one of the most extensive estuary systems in the world, which extends from the Rio Grande River to Florida Bay (**Figure 4-1**). Estuaries represent a transition zone between the freshwater of rivers and the higher salinity waters offshore. Estuaries provide habitat for plants, animals, and humans. Marshes, mangroves, and seagrasses surround the Gulf Coast estuaries and provide food and shelter for shorebirds, migratory waterfowl, fish, invertebrates (e.g., shrimp, crabs, and oysters), reptiles, and mammals. A search was conducted for new information related to coastal water quality published since completion of the Multisale EIS. An Internet search for relevant scientific journal articles was conducted using a publicly available search engine. In addition, the websites for Federal and State agencies, and the Gulf of Mexico Alliance were reviewed for newly released information. The Gulf of Mexico Alliance, a partnership between the Gulf States, was organized in 2005 as a collaborative means to solve regional problems to implement the U.S. Ocean Action Plan.

Although new research and ongoing monitoring information is continuously available from many sources about various water quality parameters in the Gulf of Mexico, the new information located was related to issues that have already been presented in the Multisale EIS and are summarized in this SEIS; therefore, it was not incorporated (Ache, written communication, 2007; USEPA, 2007d-e; LADEQ, 2007a; Texas Commission on Environmental Quality, 2007).

Gulf Coast water quality was given a fair rating in the National Coastal Condition Report II (USEPA, 2004a). Estuaries with a poor water quality rating comprised 9 percent of the Gulf Coast estuaries, while those ranked fair to poor comprised 55 percent. In Texas and Louisiana, estuaries that received a poor water quality rating in the report had low water clarity and high dissolved inorganic phosphorus in comparison with levels expected for that region. In Florida and Mississippi estuaries, the factors that contributed to a poor water quality rating were low water clarity and high chlorophyll relative to expected levels. Chlorophyll is one of several symptoms of eutrophic conditions. Dissolved oxygen levels in Gulf Coast estuaries are good and less than 1 percent of bottom waters exhibit hypoxia (dissolved oxygen below 2 milligrams (mg) per liter (L)). However, areas of low dissolved oxygen form around Chandeleur and Breton Sounds, some shoreline regions of Lake Pontchartrain, and small estuaries associated with Galveston Bay, Mobile Bay, and Mississippi Sound.

In June 2007, USEPA issued the National Estuary Program Coastal Condition Report (USEPA, 2007f). This report was the third in a series of coastal environmental assessments. However, the first two reports covered all U.S. coastal waters, whereas this report assessed just those estuaries in the National Estuary Program. The report described conditions at four Gulf Coast estuaries near the MMS CPA and WPA, Mobile Bay, Barataria Terrebonne Estuary, Galveston Bay, and Coastal Bend Bays and Estuaries (Corpus Christi Bay Estuary). A water quality rating was determined and Coastal Bend Bays, Barataria Terrebonne Estuary, and Mobile Bay were rated fair, but Galveston Bay was rated poor due to elevated dissolved phosphorus and higher turbidity.

Sediments can serve as a sink for contaminants that were originally transported via water in either dissolved or particulate form or via atmospheric deposition. Sediments may contain pesticides, metals, and organics. The sediments of Gulf Coast estuaries were ranked as fair. Metals were the type of sediment contamination found to most frequently exceed toxicity guidance.

Hurricanes Katrina and Rita caused extensive flooding and damage to industrial and municipal waste facilities and to residential and commercial structures. Industrial and agricultural chemicals, household chemicals, sewage, oil, and nutrients contained in the flood waters had the potential to degrade water quality in coastal areas. Testing following the storm identified low levels of fecal coliform in Mississippi Sound and Louisiana coastal waters. Very few toxics were detected in estuarine or coastal waters resulting from the hurricanes (USEPA, 2006a).

4.1.2.1.2. Impacts of Routine Events

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA or WPA proposed action on coastal water quality is presented in Chapters 4.2.2.1.2.1 and 4.2.1.1.2.1 of the Multisale EIS, respectively. Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, the area is not applicable to this coastal water quality discussion.

The routine activities associated with a proposed action that would impact coastal water quality include installation of pipelines in coastal waters, maintenance dredging of navigational canals, service vessel discharges, and nonpoint-source runoff from onshore facilities.

Sediment disturbance and turbidity may result from nearshore pipeline installation or maintenance dredging. The installation of pipelines can increase the local total suspended solids in the water. The adverse effect on water quality would be temporary and localized. Chapter 4.1.2.1.7 of the Multisale EIS states, for the nearshore sections of OCS pipelines, State permits for constructing pipelines would require that turbidity impacts be mitigated through the use of turbidity screens and other turbidity reduction or confinement equipment. Maintenance dredging will also temporarily increase turbidity levels in the vicinity of the dredging and disposal of materials.

In coastal waters, the water quality would be impacted by the discharges from the service vessels in port. The types of discharges and regulations were discussed in Chapters 4.1.1.4.8 and 4.1.2.2.2 of the Multisale EIS. Most discharges are treated or otherwise managed prior to release. In coastal waters, bilge and ballast water may be discharged with an oil content of 15 ppm or less. The discharges would affect the water quality locally. Estimates of the volume of bilge and ballast water that may be discharged are not available.

Supporting onshore facilities discharge into local wastewater treatment plants and waterways during routine operations. The types of onshore facilities were discussed in Chapter 4.1.2.2.1 of the Multisale EIS. All point-source discharges are regulated by the USEPA, the agency responsible for coastal water quality, or the USEPA-authorized State agency. The USEPA NPDES storm-water effluent limitation guidelines control storm-water discharges from support facilities. Indirect impacts could occur from nonpoint-source runoff, such as rainfall, which has drained from infrastructure such as a public road and parking lot, and may contribute hydrocarbons, trace-metal pollutants and suspended sediments. Data are not available to make estimates of the impact from this type of discharge.

CPA Proposed Action Analysis

The routine activities associated with a CPA proposed action that would impact coastal water quality include installation of pipelines in coastal waters, maintenance dredging of navigational canals, service-vessel discharges, and nonpoint-source runoff from onshore facilities.

One to three new pipelines are projected to be installed in State waters as a result of a CPA proposed action. These new installations could temporarily increase the local total suspended solids in the water. The COE and State permits would require these turbidity impacts to be mitigated through the use of turbidity screens and other turbidity reduction or confinement equipment.

No new navigational channels are expected to be dredged as a result of a CPA proposed action; however, a CPA proposed action would contribute to maintenance dredging of existing navigational canals. Maintenance dredging would temporarily increase turbidity levels in the vicinity of the dredging and disposal of materials.

Service-vessel round trips projected for a CPA proposed action are 119,000-241,000 trips over the life of a proposed action. Based on current service base usage, it is assumed the majority of these trips would occur in Louisiana's coastal waters. Allowable bilge and ballast water discharges would affect the water quality locally. Impacts should be minimal as long as existing regulations are met.

Up to one new gas processing plant is projected as a result of a CPA proposed action. In addition, a CPA proposed action would contribute to the use of existing onshore facilities in Texas, Louisiana, Mississippi, and Alabama. These supporting onshore facilities would discharge into local wastewater treatment plants and waterways during routine operations. These point-source discharges would be regulated by the USEPA or the USEPA-authorized State agency, which would require point-source discharges to meet criteria prior to discharge. These direct impacts would be minimal if all existing regulatory requirements are met. Indirect impacts would occur from nonpoint-source runoff, such as rainfall, which has drained from infrastructure such as a public road or parking lot, and may contribute hydrocarbon and trace-metal pollutants. These indirect impacts would be minimal and difficult to discern from other sources.

WPA Proposed Action Analysis

The routine activities associated with a WPA proposed action that would impact coastal water quality include installation of pipelines in coastal waters, maintenance dredging of navigational canals, service vessel discharges, and nonpoint-source runoff from onshore facilities.

One to three new pipelines are projected to be installed in State waters as a result of a WPA proposed action. These new installations could temporarily increase the local total suspended solids in the water. The COE and State permits would require these turbidity impacts to be mitigated through the use of turbidity screens and other turbidity reduction or confinement equipment.

No new navigational channels are expected to be dredged as a result of a WPA proposed action; however, a WPA proposed action would contribute to maintenance dredging of existing navigational canals. Maintenance dredging would temporarily increase turbidity levels in the vicinity of the dredging and disposal of materials.

Service-vessel round trips projected for a WPA proposed action are 94,000-155,000 trips over the life of a proposed action. Based on current service base usage, it is assumed the majority of these trips would occur in Texas' coastal waters. Allowable bilge and ballast water discharges would affect the water quality locally. Impacts should be minimal as long as existing regulations are met.

Up to one new gas processing plant is projected as a result of a WPA proposed action. In addition, a WPA proposed action would contribute to the use of existing onshore facilities in Texas, Louisiana, Mississippi, and Alabama. These supporting onshore facilities would discharge into local wastewater treatment plants and waterways during routine operations. These point-source discharges would be regulated by the USEPA or the USEPA-authorized State agency, which would require point-source discharges to meet criteria prior to discharge. These direct impacts would be minimal if all existing regulatory requirements are met. Indirect impacts would occur from nonpoint-source runoff, such as rainfall, which has drained from infrastructure such as a public road or parking lot, and may contribute hydrocarbon and trace-metal pollutants. These indirect impacts would be minimal and difficult to discern from other sources.

Summary and Conclusion

The routine activities associated with a CPA or WPA proposed action that would impact coastal water quality include installation of pipelines in coastal waters, maintenance dredging of navigational canals, service-vessel discharges, and nonpoint-source runoff from onshore facilities. Turbidity impacts from pipeline installation and maintenance dredging would be temporary and localized. Impacts from service vessel and onshore facility discharges would be minimal if all existing regulatory requirements are met.

The MMS has reexamined the analysis for coastal water quality presented in the Multisale EIS, based on the additional information presented above. No significant new information was found that would alter the overall conclusion that impacts on coastal water quality from routine activities associated with a CPA or WPA proposed action would be minimal. A small increase in vessel traffic would result from the inclusion of the 181 South Area. This small increase in vessel traffic would have minimal impact on coastal water quality.

4.1.2.1.3. Impacts of Accidental Events

Accidental events associated with a CPA or WPA proposed action that could impact coastal water quality include spills of oil and refined hydrocarbons, spills of chemicals or drilling fluids, and collisions that result in spills. Water quality is altered and degraded by oil spills through the increase of petroleum hydrocarbons and their various transformation/degradation products in the water. The extent of impact from a spill depends on the behavior and fate of oil in the water column (e.g., movement of oil and rate and nature of weathering), which, in turn, depends on oceanographic and meteorological conditions at the time. The various fractions within the crude behave differently in water. The lighter ends are more water soluble and would contribute to acute toxicity. As the spill weathers, the aromatic components at the water's surface are more likely to exit the water. The heavier fractions are less water soluble and would partition to organic matter. This fraction is more likely to persist in sediments and would contribute to longer-term impacts.

The National Academy of Sciences (NRC, 2003) and Boesch and Rabalais (1987) have reviewed the fate and effects of spilled oil. In general, the impacts to water quality are greatest when a spill occurs in a confined area where it persists for a long period of time. In an environment where the oil can be dispersed or diluted, the impacts are reduced. Spills of opportunity are few and difficult to sample on short notice. The evaluation of impacts from a large spill on water quality is based on qualitative and speculative information.

CPA and WPA Proposed Actions Analysis

Oil 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. Chapter 4.3.1.7 of the Multisale EIS presents the risk of coastal spills associated with a proposed action.

The ability of coastal waters to assimilate spilled oil is affected by the shallowness of the environment. Large volumes of water are not available to dilute suspended oil droplets and dissolved constituents. Since oil does not mix with water and is usually less dense, most of the oil forms a slick at the surface. Small droplets in the water may adhere to suspended sediment and be removed from the water column. Oil contains toxic aromatic compounds such as benzene, toluene, xylenes, naphthalenes, and polynuclear aromatic hydrocarbons, which are soluble to some extent in water. The effect of these compounds on water quality depends on the circulation in the coastal environment, the composition of the spilled oil, and the length of time the oil is in contact with the water. Oil may also penetrate sand on the beach or be trapped in wetlands, where it can be re-released into the water some time after the initial spill.

Chemical Spills

A study of chemical spills from OCS activities determined that accidental releases of zinc bromide and ammonium chloride could potentially impact the marine environment (Boehm et al., 2001). Both of these chemicals are used for well treatment or completion and are not in continuous use; thus, the risk of a spill is small. Most other chemicals are either nontoxic or used in such small quantities that a spill would not result in measurable impacts. Zinc bromide is of particular concern because of the toxic nature of zinc. Close to the release point of an ammonium chloride spill, the ammonia concentrations could exceed toxic levels for time scales of hours to days.

Collisions

A collision may result in the spillage of crude oil, refined products such as diesel, or chemicals. Diesel is the type of refined hydrocarbon spilled most frequently as the result of a collision. Minimal impacts result from a spill since diesel is light and will evaporate and biodegrade within a few days. Since collisions occur infrequently, the potential impacts to marine water quality are not expected to be significant.

Summary and Conclusion

Smaller spills (<1,000 bbl) are not expected to significantly impact water quality in coastal waters. Larger spills, however, could impact water quality in coastal waters.

4.1.2.1.4. Cumulative Impacts

A detailed description of cumulative impacts upon water quality can be found in Chapter 4.5.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS.

The Gulfwide, OCS-related cumulative activities that would impact coastal water quality include the installation of pipelines in coastal waters, maintenance dredging of navigational canals, service-vessel discharges, and nonpoint-source runoff from onshore facilities. Existing and future non-OCS activities occurring in the Gulf of Mexico that would affect coastal water quality include the transportation of oil, gas, and commodities, and the activities of other Federal agencies. Discharges from domestic and foreign commercial and military vessels would adversely affect the quality of water in the Gulf of Mexico.

The water quality of coastal environments will be affected by the cumulative input of hydrocarbons and trace metals from activities that support oil and gas extraction. These activities include bilge water from service vessels and point- and nonpoint-source discharges from supporting infrastructure. Discharges from service vessels are regulated by the USCG to minimize cumulative impacts. The USEPA regulates point-source discharges. Chapter 4.5.2.1 of the Multisale EIS summarizes the regulatory programs designed to protect the waters that enter the Gulf. If these and other water quality programs and regulations continue to be administered and enforced, it is not expected that additional oil and gas activities will adversely impact the overall water quality of the region.

Inflows from rivers such as the Mississippi River also influence coastal water quality. When inflows transport constituents that degrade water quality, such as suspended sediments or nutrients, adverse effects can result. Such discharges impact water quality in the Gulf and, during periods of water-column stratification, have influenced the development of an extensive hypoxic zone. In comparison with the Mississippi and Atchafalaya Rivers' input, it is estimated that produced water contributes from 0.02 to 0.2 percent of the nitrogen to the hypoxic zone (Veil et al., 2005).

Dredging and channel erosion can add to the suspended load of local waterways. Support vessels as well as other activities such as commercial fishing and shipping use the waterways. Specific information concerning the direct impacts from OCS activities is not available to evaluate the degradation of water quality in the waterways. However, MMS assumes that the existing water quality programs in each State would identify OCS-related activities that degrade water quality and correct the problem.

Accidental releases of oil or chemicals would degrade water quality during the spill and after until the spill is either cleaned up or natural processes disperse the spill. Chapter 4.5.2.1 of the Multisale contains more information on accidental releases.

A major hurricane can result in a greater number of coastal oil and chemical spill events with increased spill volume. As occurred in 2005, damage to infrastructure would delay response to the spills, and flooding may increase the dispersion of the spills.

Summary and Conclusion

Water quality in coastal waters would be impacted by sediment resuspension due to pipeline installation, maintenance dredging of navigational canals, discharges related to supply vessel usage, and shore-based infrastructure associated with a proposed action. The Gulf of Mexico coastal water is additionally impacted by numerous diverse factors including river inflows, urbanization, agricultural practices, municipal wastes discharges, and coastal industry. The impacts resulting from a proposed action are a small addition to the cumulative impacts on the coastal waters of the Gulf. The incremental contribution of the routine activities associated with a proposed action to the cumulative impacts to coastal water quality is not expected to be significant as long as all regulations are followed. The incremental contribution of accidents is also small. Using a rough estimate, OCS sources comprise about 10 percent (40-50) of small coastal spills that occur each year in the Gulf of Mexico. It is important to note that the impacts of a spill are determined by factors such as season and location, in addition to size.

4.1.2.2 Marine Waters

4.1.2.2.1. Description of the Affected Environment

A detailed description of water quality in marine waters can be found in Chapter 3.1.2.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

The marine water within the area of interest can be divided into three regions: the continental shelf west of the Mississippi River, the continental shelf east of the Mississippi River, and deep water (>400 m or >1,312 ft). For this discussion, the continental shelf includes the upper slope to a water depth of 400 m (1,312 ft). While the various parameters measured to evaluate water quality do vary in marine waters, one parameter, pH, does not. The buffering capacity of the marine system is controlled by carbonate and bicarbonate, which maintain the pH at 8.2.

A search was conducted for new information related to marine water quality published since completion of the Multisale EIS. An Internet search for relevant scientific journal articles was conducted using a publicly available Internet search engine. In addition, the websites for Federal agencies, and the Gulf of Mexico Alliance were reviewed for newly released information. The Gulf of Mexico Alliance, a partnership between the Gulf States, was organized in 2005 as a collaborative means to solve regional problems to implement the U.S. Ocean Action Plan.

Continental Shelf West of the Mississippi River

The Mississippi and Atchafalaya Rivers are the primary sources of freshwater, sediment, and pollutants to the continental shelf west of the Mississippi (Murray, 1997). The drainage basin that feeds the rivers covers 55 percent of the contiguous U.S. A turbid surface layer of suspended particles is associated with the freshwater plume from these rivers. A nepheloid layer composed of suspended clay material from the underlying sediment is always present on the shelf.

During summer months, the low-salinity water from the Mississippi River spreads out over the shelf, resulting in a stratified water column. While surface oxygen concentrations are at or near saturation, hypoxia (dissolved oxygen less than 2 mg/L), is observed in bottom waters during the summer months (Figure 3-3 of the Multisale EIS). The zone of hypoxia on the Louisiana-Texas shelf occurs seasonally and is affected by the timing of the Mississippi and Atchafalaya Rivers' discharges carrying nutrients to the surface waters.

New information is available on the hypoxic zone and efforts to reduce its size. In August 2007, the zone measured 20,500 km^2 (7,900 mi^2), the third largest measured area since monitoring began in 1985 (LUMCON, 2007). A reassessment of hypoxia in the northern Gulf of Mexico was begun in 2005. An independent panel, the Science Advisory Board, was convened to evaluate new studies and nutrient control actions. The Panel Draft Advisory Report (USEPA, 2007g) points out that the goal to reduce the size of the zone by 2015 may take longer than anticipated and that the Nation's push towards corn-based ethanol production will alter agricultural practices, which, in turn, could increase rather than decrease nutrients in river water that contribute to hypoxia. A second area of hypoxia was found off the Texas coast in the summer of 2007. Following heavy inland rains, a 4,530-km^2 (1,750-mi^2) area of hypoxia was discovered off the Brazos River (Graczyk, 2007).

Continental Shelf East of the Mississippi River

Water quality on the continental shelf from the Mississippi River Delta to Tampa Bay is influenced by river discharge, run-off from the coast, and eddies from the Loop Current. The outflow of the Mississippi River generally extends only 45 mi (75 km) to the east of the river mouth (Vittor and Associates, Inc., 1985) except under extreme flow conditions. The Loop Current intrudes in irregular intervals onto the shelf, and discharges from the Mississippi River can be easily entrained in the Loop Current. Hypoxia is rarely observed on the Mississippi-Alabama shelf, although low dissolved oxygen values of 2.93-2.99 mg/L were observed during the Mississippi-Alabama Marine Ecosystem Study (MAMES) and northeastern Gulf of Mexico (NEGOM) cruises (Brooks, 1991; Jochens et al., 2002).

The Mississippi-Alabama shelf sediments are strongly influenced by fine sediments and nutrients discharged from the Mississippi River. The shelf area is characterized by a bottom nepheloid layer and surface lenses of suspended particulates that originate from river outflow. The West Florida Shelf has very little sediment input with primarily high-carbonate sands offshore and quartz sands nearshore. The water clarity is higher towards Florida, where the influence of the Mississippi River outflow is rarely observed.

A 3-year, large-scale marine environmental baseline study conducted from 1974 to 1977 in the Eastern Gulf of Mexico resulted in an overview of the Mississippi, Alabama, and Florida (MAFLA) OCS environment to 200 m (656 ft) (SUSIO, 1977; Dames and Moore, 1979). A decade later, the continental shelf off Mississippi and Alabama was revisited (Brooks, 1991). The source of petroleum hydrocarbons and terrestrial plant material is the Mississippi River. The SAIC (1997) summarized information about water quality on the shelf from DeSoto Canyon to Tarpon Springs and from the coast to a 200-m (656-ft) water depth. Several small rivers and the Loop Current are the primary influences on water quality in this region. Because there is relatively little onshore development in this area, the waters and surface sediments are uncontaminated. The Loop Current flushes the area with clear, low-nutrient water.

The NEGOM chemical oceanography and hydrography study (1997-2000) noted that interannual variation in the parameters measured outweighed seasonal variation due to the influence of offshelf circulation features and interannual variation in wind (Jochens et al., 2002). The highest chlorophyll *a* amounts measured in near-surface water were located in the areas influenced by the Mississippi and Apalachicola Rivers. Hypoxia was not observed on the shelf during the 3 years of the study.

Although new research and ongoing monitoring information is continuously available from many sources about various water quality parameters in the Gulf of Mexico, the new information located was related to issues that have already been presented in the Multisale EIS and are summarized in this SEIS; therefore, it was not incorporated (Ache, written communication, 2007; USEPA, 2007d-e; LADEQ, 2007a; Texas Commission on Environmental Quality, 2007).

Deep Water

Limited information is available on the deepwater environment. Water at depths greater than 1,400 m (4,593 ft), including the 181 South Area, is relatively homogeneous with respect to temperature, salinity, and oxygen (Nowlin, 1972; Pequegnat, 1983; Gallaway et al., 1988). The major source of oxygen in deep waters is the transport of oxygen-rich water through the Yucatan Channel. Available data indicate that oxygen replenishment is adequate to balance oxygen consumption in deep waters; however, localized areas of depleted oxygen could exist as the result of natural conditions or anthropogenic activities such as the discharge from oil and gas activities (Jochens et al., 2005).

Limited analyses of trace metals and hydrocarbons for the water column and sediments exist (Trefry, 1981; Gallaway et al., 1988). The MMS recently completed a field study of four drilling sites located in water depths of 1,033-1,125 m (3,389-3,691 ft) (CSA, 2006), results of which are summarized in Chapter 3.1.2.2 of the Multisale EIS. The sampling design called for before and after exploratory or development drilling and captured the drilling-related changes that occur in sediments and sediment pore water. Hydrocarbon seeps are extensive throughout the continental slope and contribute hydrocarbons to the surface sediments and water column, especially in the Central Gulf of Mexico (Sassen et al., 1993a and b). MacDonald et al. (1993) observed 63 individual seeps using remote sensing and submarine observations. Estimates of the total volume of seeping oil vary widely from 29,000 bbl/yr (MacDonald, 1998a) to 520,000 bbl/yr (Mitchell et al., 1999).

Although new research and ongoing monitoring information is continuously available from many sources about various water quality parameters in the Gulf of Mexico, the new information located was related to issues that have already been presented in the Multisale EIS and are summarized in this SEIS; therefore, it was not incorporated (Ache, written communication, 2007; USEPA, 2007d-e; LADEQ, 2007a; Texas Commission on Environmental Quality, 2007).

4.1.2.2.2. Impacts of Routine Events

Background/Introduction

A detailed description of the potential impacts from routine activities associated with a CPA or WPA proposed action on marine water quality is presented in Chapters 4.2.2.1.2.2 and 4.2.1.1.2.2 of the Multisale EIS, respectively.

The routine activities associated with a proposed action that would impact marine water quality include discharges of drilling muds and cuttings during the drilling of exploration and development wells, discharges during a workover, structure installation and removal, discharges during production, pipeline installation, and service-vessel discharges including bilge and ballast water and discharges from the marine sanitation device.

The drilling of exploratory and development wells results in the discharges of drilling fluids, called "muds," and cuttings. Muds are the weighted fluids used to lubricate the drill bit, and cuttings are the ground rock displaced from the well. The USEPA regulates the discharge of muds and cuttings to the Gulf of Mexico. Water-based muds and cuttings may be discharged. Synthetic-based drill fluids are manufactured hydrocarbons and have been increasingly used over the past 20 years because they perform well in deep water and reduce drilling time. The USEPA promulgated Effluent Limitations Guidelines, and the discharge of cuttings wetted with SBF was incorporated into the general NPDES permits of both Region 4 and Region 6. The SBF may not be discharged; it is recycled. Water-based muds and cuttings that are discharged increase turbidity in the water column and alter the sediment characteristics in the area where they settle. The SBF-wetted cuttings do not disperse as readily in water and descend in clumps to the seafloor. The SBF on the wetted cuttings gradually breaks down and may deplete the oxygen level at the sediment water interface as it degrades. Characteristics of drilling muds and cuttings, the impacts of discharge, and regulatory controls are discussed in greater detail in Chapter 4.1.1.4.1 of the Multisale EIS.

Additional chemical products are used to "workover" or treat a well. A wide range of products fall into this category. Chemicals include brines used to protect a well, acids used to increase well production, and miscellaneous products used to separate water from oil, to prevent bacterial growth, or to eliminate scale formation or foaming are just some examples. Some additives remain in the oil or gas phase while others remain in the produced water where they are diluted or neutralized. The USEPA regulates the discharge to waters of the Gulf of Mexico. Characteristics of workover treatment and production chemicals, the impacts of discharge, and regulatory controls are discussed in greater detail in Chapter 4.1.1.4.3 of the Multisale EIS.

During structure installation and removal, impacts from anchoring, mooring, pipeline and flowline emplacement, and placement of subsea production structures may occur. The disturbance of the seafloor will increase turbidity in the surrounding water. Additional information on bottom-area disturbance is available in Chapter 4.1.1.3.2.1 of the Multisale EIS.

During production, produced water is brought up from the hydrocarbon-bearing strata along with the oil and gas that is generated. It may contain dissolved solids in higher concentrations than Gulf waters, metals, hydrocarbons, and naturally-occurring radionuclides. Produced water may contain residuals from the treatment completion or workover compounds used, as well as additives used in the oil/water separation process. Produced water is treated before discharge to meet the NPDES discharge requirements. Characteristics of produced water, the impacts of discharge, and regulatory controls are discussed in greater detail in Chapter 4.1.1.4.2 of the Multisale EIS.

The installation of a pipeline would result in a temporary increase in turbidity. In waters <200 ft (61 m), MMS required burial to a depth of at least 3 ft (1 m) below the mudline. Jetting to dig the trench for the pipeline disturbs the bottom sediments and results in a temporary increase in turbidity. In deeper waters the pipeline is laid upon the seafloor. A description of the pipeline installation is provided in Chapter 4.1.1.8.1 of the Multisale EIS.

Service-vessel discharges include bilge and ballast water and sanitary waste. Bilge water is often contaminated with oil. Regulations that set limits for oil in bilge water will minimize the impact to water quality. Ballast water is less likely to contain oil but is subject to the same limits. The marine sanitation device is required to treat sanitary waste generated on the service vessel so that surrounding water will not be impacted by possible bacteria or viruses in the waste. The discharge of treated sanitary waste will still contribute some small amount of nutrients to the water. A description of service-vessel operational wastes is provided in Chapter 4.1.1.4.8 of the Multisale EIS.

CPA Proposed Action Analysis

The routine activities associated with a CPA proposed action that would impact marine water quality include discharges of drilling muds and cuttings during drilling of exploration and development wells, discharges during a workover, structure installation and removal, discharges during production, and pipeline installations and discharges from service vessels. These activities in the 181 South Area would have the same impact as in the deep water of the rest of the CPA.

Water-based drilling fluids and cuttings and SBF-wetted cuttings will increase turbidity in the water column and change the composition and grain size of sediments in the area of the seafloor where discharges accumulate. The inclusion of the 181 South Area is projected to result in the drilling of a total of 67-99 exploratory and delineation wells and 337-477 development wells. The MMS expects that 80 percent of the wells will be drilled with SBF and that 20 percent will be drilled with WBF. A volume of 213,892-472,265 bbl of cuttings wetted with SBF is projected. A volume of 160,800-343,800 bbl and 557,815-1,111,620 bbl of water-based cuttings and WBF, respectively, are projected to be discharged.

Additional chemicals that could intermingle with produced water and be discharged are used during workover activities. The 181 South Area is projected to result in 2,051-2,898 workovers and other well activities.

Bottom disturbances and increased water turbidity result from structure installation and removal. The installation of 28-40 structures and the removal of 24-36 structures are projected to result from a proposed action in the CPA. This includes the installation and removal of up to one structure associated with the addition of the 181 South Area.

Discharges associated with production include produced water, the water that comes up the wellbore with the oil, and sanitary and domestic waste discharges. These wastes must be treated prior to discharge so that impacts to water will be negligible. The scenario projects that 337-477 development wells will be drilled, of which 293 14, or 87 percent, are expected to produce. The average volume of produced water per well is 0.084 MMbbl per year. The concentration of oil and grease in produced water is 29 mg/L and the specific gravity of the oil is 0.9. Using these assumptions, the volume of oil discharged to the Gulf via produced-water discharge was estimated to be 793-1,123 bbl per year in the CPA.

Ballast and bilge water and sanitary waste are generated during service-vessel trips. Approximately 119,000-241,000 service-vessel round trips are projected to result from a proposed action in the CPA, including activities associated with the addition of the 181 South Area.

The installation of pipelines results in bottom disturbances. The inclusion of the 181 South Area is projected to result in the installation of an additional 130-2,075 km (81-1,289 mi) of pipeline.

WPA Proposed Action Analysis

The routine activities associated with a WPA proposed action that would impact marine water quality include discharges of drilling muds and cuttings during drilling of exploration and development wells, discharges during a workover, structure installation and removal, discharges during production, and pipeline installations and discharges from service vessels.

A WPA proposed action is projected to result in the drilling of a total of 42-66 exploratory and delineation wells and 155-221 development wells. The MMS expects that 80 percent of the wells will be drilled with SBF and that 20 percent will be drilled with WBF. A description of waste volumes is in Chapter 4.2.1.1.2.2 of the Multisale EIS.

Additional chemicals that could intermingle with produced water and be discharged are used during workover activities. A WPA proposed action is projected to result in 945-1,344 workovers and other well activities.

Bottom disturbances and increased water turbidity result for structure installation and removal. A WPA proposed action is projected to result in the installation of 28-41 structures and the removal of 20-31 structures.

Discharges associated with production include produced water, the water that comes up the wellbore with the oil, and sanitary and domestic waste discharges. These wastes must be treated prior to discharge so that impacts to water will be negligible. The scenario projects that 155-221 development wells will be drilled, of which 87 percent are expected to produce. The average volume of produced water per well is 0.084 MMbbl per year. The concentration of oil and grease in produced water is 29 mg/L and the specific gravity of the oil is 0.9. Using these assumptions, the volume of oil discharged to the Gulf via produced-water discharge was estimated to be 363-516 bbl oil per year in the WPA. Greater volumes of produced water are associated with oil rather than gas production. Therefore, greater volumes of oil will likely be discharged in the oil-producing areas of the WPA than in the gas-producing areas.

Ballast and bilge water and sanitary waste are generated during service-vessel trips. A WPA proposed action is projected to result in 94,000-155,000 service-vessel round trips.

The installation of pipelines results in bottom disturbances. A WPA proposed action is projected to result in the installation of 130-760 km (81-472 mi) of pipeline.

Summary and Conclusion

During exploratory activities, the primary impacting sources to marine 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 levels of contaminants in these discharges. Pipeline installation can also affect water quality by sediment disturbance and increased turbidity. Service-vessel discharges include water with oil concentration of <15 ppm. Impacts to marine waters from routine activities associated with a proposed action in the CPA, including the 181 South Area, and WPA should be minimal as long as regulatory requirements are followed.

4.1.2.2.3. Impacts of Accidental Events

Accidental events associated with a CPA or WPA proposed action in the that could impact marine water quality include spills of oil and refined hydrocarbons, spills of chemicals or drilling fluids, and collisions and losses of well control that result in spills. Water quality is altered and degraded by oil spills through the increase of petroleum hydrocarbons and their various transformation/degradation products in the water. The extent of impact from a spill depends on the behavior and fate of oil in the water column (e.g., the movement of oil and the rate and nature of weathering), which, in turn, depends on oceanographic and meteorological conditions at the time. The various fractions within the crude behave differently in water. The lighter ends are more water soluble and would contribute to acute toxicity. As the spill weathers, the aromatic components at the water's surface are more likely to evaporate. The heavier fractions are less water soluble and would partition to organic matter. This fraction is more likely to persist in sediments and would contribute to longer-term impacts.

The National Academy of Sciences (NRC, 2003) and Boesch and Rabalais (1987) have reviewed the fate and effects of spilled oil. In general, the impacts to water quality are greatest when a spill occurs in a confined area where it persists for a long period of time. In an environment where the oil can be dispersed or diluted, the impacts are reduced. Spills of opportunity are few and difficult to sample on short notice. The evaluation of impacts from a large spill (≥1,000 bbl) on water quality is based on qualitative and speculative information.

CPA and WPA Proposed Actions Analysis

Oil Spills

The Gulf of Mexico has numerous natural hydrocarbon seeps, as discussed in **Chapters 3.1.2.2 and 4.1.3.4**. The marine environment can be considered adapted to handling small amounts of oil released over time. Most of the oil spills that may occur as a result of a proposed action are expected to be ≤1 bbl (**Tables 3-6 and 3-7**).

An oil spill ≥1,000 bbl at the water surface may result from a platform accident. Subsurface spills would occur from subsea riser or pipeline failure or a loss of well control. Most of the oil from a subsurface spill would likely rise to the surface and would weather and behave similarly to a surface spill, depending upon a number of factors, particularly the characteristics of the released oil and oceanographic conditions. Oil in the 181 South Area is reported to be denser than the typical Gulf of Mexico oil; therefore, it may rise to the surface more slowly. Some of the subsurface oil may also get dispersed within the water column, as in the case of the *Ixtoc I* seafloor blowout. Evidence from a recent experiment in the North Sea indicates that oil released during a deepwater blowout would quickly rise to the surface and form a slick (Johansen et al., 2001). Impacts from a deepwater oil spill would occur in the water column and at the surface where the oil would be mixed into the water and dispersed by wind waves. An additional discussion of the impacts of accidental spills to water quality is found in the Chapter 4.4.2.2 of the Multisale EIS.

Chemical Spills

A study of chemical spills from OCS activities determined that the accidental releases of zinc bromide and ammonium chloride could potentially impact the marine environment (Boehm et al., 2001). Both of these chemicals are used for well treatment or completion and are not in continuous use; thus, the risk of a spill is small. Most other chemicals are either nontoxic or used in such small quantities that a spill would not result in measurable impacts. Zinc bromide is of particular concern because of the toxic nature of zinc. Close to the release point of an ammonium chloride spill, the ammonia concentrations could exceed toxic levels for time scales of hours to days.

Accidental Releases of Drilling Fluids

As a result of the specific gravity of SBF, an accidental release of synthetic-based drilling fluids would be expected to sink to the seafloor in the area immediately at and adjacent to the release site. Localized anoxic conditions at the seafloor would be expected to occur. This would be short term, lasting until the SBF decomposed. A study of an SBF spill-of-opportunity is currently in preparation (USDOI, MMS, in preparation).

Collisions

A collision may result in the spillage of crude oil, refined products such as diesel, or chemicals. Diesel is the type of refined hydrocarbon spilled most frequently as the result of a collision. Minimal impacts result from a spill since diesel is light and will evaporate and biodegrade within a few days. Since collisions occur infrequently, the potential impacts to marine water quality are not expected to be significant.

Loss of Well Control

A loss of well control (LWC) includes events with no surface expression or impact on water quality to events with a release of oil or drilling fluids. A LWC event may result in localized suspension of sediments, thus affecting water quality temporarily. Results from a recent simulated experiment of a deepwater blowout indicated that the oil rose from 850 m (2,789 ft) to the surface in approximately 1 hr.

Since LWC events and blowouts are rare events and are of short duration, potential impacts to marine water quality are not expected to be significant.

Summary and Conclusion

Smaller spills (<1,000 bbl) are not expected to significantly impact water quality in marine waters. Accidental chemical spills, release of SBF, and blowouts would have temporary localized impacts on water quality.

4.1.2.2.4. Cumulative Impacts

Water quality in marine waters will be impacted by the discharges from drilling, production, and removal activities. Sources not related to oil and gas activities that can impact marine water quality include bilge water discharges from large ships and tankers; coastal pollutants that are transported away from shore, including runoff, river input, sewerage discharges, and industrial discharges; and natural seepage of oil and trace metals.

As discussed in Chapter 4.1.3.4 of the Multisale EIS, petroleum hydrocarbons can enter the Gulf of Mexico from a wide variety of sources. The major sources of oil inputs in the Gulf are natural seepage, produced waters, land-based discharges, and spills. Although the Gulf of Mexico comprises one of the world's most prolific offshore oil-producing provinces as well as has heavily traveled tanker routes, inputs of petroleum from onshore sources far outweigh the contribution from offshore activities. The introduction of petroleum hydrocarbons resulting from human activity is generally concentrated in major municipal and industrial areas situated along coasts or large rivers that empty into coastal waters.

The OCS-related cumulative activities that would impact marine water quality include discharges of drilling muds and cuttings during the drilling of exploration and development wells, discharges during a workover, structure installation and removal, discharges during production, pipeline installation, and service-vessel discharges including bilge and ballast water and discharges from the marine sanitation device. Chapter 4.5.2.2 of the Multisale EIS summarizes the drilling predicted to result from the OCS Program. From the MMS database, about 1,200 wells are spudded each year in the Gulf of Mexico. The inclusion of the 181 South Area in the proposed CPA sale area is projected to result in 9-12 additional wells above the projected 499-714 wells stated in the Multisale EIS. The impacts from drilling were discussed in Chapters 4.2.1.1.2.2 and 4.2.2.1.2.2 of the Multisale EIS. The impacts would be related to increased water turbidity in the vicinity of the operations and the addition of soluble contaminants to the water column. The additional impact to water quality from the proposed actions would be expected to be small compared with those derived from non-OCS activities, which are much more extensive. Studies thus far indicate that as long as discharge regulations are followed, impacts to the marine environment from drilling activities are not significant.

Oil spills in the Gulf of Mexico also adversely affect water quality. Chapter 4.5.2.2 of the Multisale EIS summarizes the volumes of oil that originate from many different sources and enter Gulf waters. Accidental spills of chemicals and oil are expected to impact water quality on a temporary basis and only close to the spill. Winds, waves, and currents should rapidly disperse any spill and reduce impacts.

Hurricanes may cause fuels and chemicals stored on platforms to enter the water when the structure is damaged or toppled. Structures that are blown off station may drag anchors and damage pipelines and subsea lines, resulting in the release of oil and chemicals. Loss of well control has not occurred as the result of hurricanes because of the built-in safety features.

Summary and Conclusion

Cumulative impacts on the water quality of the marine environment result from the addition of discharges from supply-vessel discharges and from the exploration, production, and removal activities to a relatively pristine environment. The incremental contribution of a proposed action to the cumulative impacts to marine water quality is not expected to be significant as long as all regulations are followed.

4.1.3. Sensitive Coastal Environments

4.1.3.1. Coastal Barrier Beaches and Associated Dunes

The MMS has reexamined the analysis for barrier islands and associated dunes presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for barrier islands and associated dunes presented in the Multisale EIS. Due to both the distance from the 181 South Area (over 130 mi or 209 km) and the prevailing easterly winds, activities associated with the 181 South Area are expected to have little to no affect on barrier islands and associated dunes.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Routine activities associated with a CPA or WPA proposed action, such as increased vessel traffic, maintenance dredging of navigation canals, and pipeline installation, would cause negligible impacts and will 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 either a CPA or WPA proposed action are anticipated to be minimal. The incremental contribution of a proposed action to the cumulative impacts to barrier beaches and associated dunes is expected to be small.

4.1.3.1.1. Description of the Affected Environment

A detailed description of the physical location and formative processes that create the various coastal beaches and barrier island complexes are described in Chapter 3.2.1.1 of the Multisale EIS. A description of integrated shoreline environments, barrier islands, and dune zones that comprise and delineate the various vegetated habitats along these mainland and barrier beaches can also be found in the Multisale EIS.

Barrier islands make up more than two-thirds of the northern Gulf of Mexico shore. Each of the barrier islands is either high profile or low profile depending on the elevations and morphology of the island (Morton et al., 2004**)**. The height and continuity of these elevations determine the ability of the barriers to withstand storm-surge flooding and overwash. Barrier islands, particularly vegetated ones with freshwater and or saltwater pools, may serve as habitat for a wide variety of animal life, especially birds. The islands and spits protect the bays, lagoons, estuaries, salt marshes, seagrass beds, and other wetland environments, some of which may contain threatened or endangered species.

A search was conducted for new information related to barrier island impacts published since completion of the Multisale EIS. An Internet search for relevant scientific journal articles was conducted using a publicly available search engine. In addition, the websites for Federal and State agencies were reviewed for newly released information, and academic researchers were contacted concerning any unpublished or forthcoming publications currently in review concerning the current state of the barrier islands and beaches along the Gulf of Mexico. Although new research and ongoing monitoring information is continuously being updated and will eventually be available from both State and Federal resource agencies, the new information found was related to issues that have already been presented in the Multisale EIS and summarized in this SEIS; therefore, it was not incorporated in its entirety in this document. However, pertinent refinements of barrier island impacts as noted in the newly released NMFS Hurricane Impact report on fishery habitat published in July 2007 (USDOC, NMFS, 2007a) is summarized below.

The barrier islands from Texas to Florida all incurred some type of damage from the combination of Hurricanes Katrina and Rita and in some cases in combination with Hurricane Wilma as well. Hurricane Katrina in August 2005 caused severe erosion and landloss for the coastal barrier islands of the deltaic plain. Although barrier islands and shorelines have some capacity to regenerate over time, the process is very slow and often incomplete. With each passing storm, the size and resiliency of these areas can be diminished, especially when major storms occur within a short time period.

Texas

The barrier islands along the northeast Texas coast were severely eroded, losing 1 ft (0.3 m) in elevation and retreating landward 98 ft (30 m) between 2001 and 2005, as a result of a combination of Hurricanes Katrina/Rita and other previous storms (Newby, 2007). The overall analysis showed gains and loses along the barrier beaches with a general landward retreat, but in some areas a parallel strip of elevation gain is also noted. In these areas the material from the beach was overwashed landward of the beach ridge with sediment deposited into low-lying areas (USDOC, NMFS, 2007a). The McFaddin NWR, Texas Point NWR, Sea Rim State Park, and J.D. Murphree State Wildlife Management Area comprise the McFaddin Complex, which contains approximately 60,000 ac (24,280 ha) of coastal marsh (i.e., fresh, intermediate, and brackish), coastal prairie (non-saline and saline), coastal woodlands, and beach/ridge habitats in Jefferson and Chambers Counties in southeast Texas (USDOC, NMFS, 2007a). The beaches and ridges along the McFaddin Complex were already experiencing a historic erosion rate of 5-7 ft (1.5-2.1 m) per year prior to Hurricanes Katrina and Rita. Post-Hurricane Rita, a remnant dune/beach system still exists although much has been lost through erosion and shoreline retreat, leaving only a low-lying, washover terrace. Loss of the existing beach dunes and the lowering of beach ridge elevations along the Gulf shoreline of the McFaddin Complex from Hurricane Rita puts approximately 30,000 ac (47 mi^2) of nationally significant wetlands at risk for saltwater intrusion.

Louisiana

The Louisiana barrier islands incurred the most damage from the 2005 hurricanes. In Louisiana, barrier islands were not only badly eroded, but elevations were reduced and the islands were moved shoreward. The Chandeleur Islands served as an important protective buffer for Louisiana's wetlands. Already badly eroded by several hurricanes between 2002 and 2005 (i.e., Hurricanes Lili, Ivan, and Dennis), these islands were nearly destroyed by Hurricane Katrina (Graumann et al., 2005; Knabb et al., 2006). The eye of Hurricane Katrina passed directly over the 50-mi (80-km) Chandeleur Island chain. The Chandeleur Islands suffered a nearly 50 percent permanent loss to both unvegetated and vegetated areas. The Chandeleur Islands were reduced by Hurricane Katrina from 5.64 mi^2 to 2.5 mi^2 (3,610 to 1,600 ac) and then to 2.0 mi^2 (1,280 ac) by Hurricane Rita (Di Silvestro, 2006).

It is likely that seagrass habitat adjacent to the Chandeleur Islands also was severely impacted by scouring and burial. East Timbalier Island lost approximately 10 ac (4 ha) from the combined effects of Hurricanes Katrina and Rita. The FWS (USDOI, FWS, 2005) reported that the Breton NWR had been reduced by about half its previous size.

Grand Isle was also heavily damaged by Hurricane Katrina. Although Hurricane Katrina made landfall more than 50 mi (80 km) to its east, Grand Isle received extremely high winds and a 12- to 20-ft (4- to 6-m) storm surge that caused tremendous structural damage to most of the island's camps, homes, and business (Louisiana Sea Grant, 2005). Boyd and Penland (1988) estimated that storms raise mean water levels 1.73-2.03 m (5.68-6.66 ft) above mean sea level 10-30 times per year. Under those conditions, the following would be overwashed: 67 percent of Timbalier Island; 100 percent of Isles Dernieres and the Barataria Bay Barriers (excluding Grand Isle); and 100, 89, and 64 percent of the southern, central, and northern portions of the Chandeleur Islands, respectively (Boyd and Penland, 1981).

Following Hurricane Katrina in August 2005, Hurricane Rita in September 2005 severely impacted the shoreface and beach communities of Cameron Parish in southwest Louisiana. Some small towns in this area have no standing structures remaining. A storm surge approaching 6 m (20 ft) caused beach erosion and overwash that flattened coastal dunes, depositing sand and debris well into the backing marshes.

Mississippi

Along the Mississippi Gulf Coast the barrier islands were also severely eroded by Hurricane Katrina. The overall size and elevation and the vegetative cover were significantly reduced by about 15 percent (USDOC, NMFS, 2007c). Mississippi's offshore barrier islands include Petit Bois, Horn, Ship, and Cat Islands. This island chain, located 12 mi (19 km) south of coastal Mississippi, provides a natural first line of defense against hurricanes and other tropical storm systems. Unfortunately, these natural barriers have suffered a series of onslaughts first by Hurricane Camille in 1969, which created a major cut through Ship Island; then by Hurricane Georges, which breached Horn Island; and several years later by Hurricanes Ivan and Katrina, which caused further damage. Hurricane Katrina alone destroyed more than 2,000 ac (809 ha) on these four islands and drastically reduced the functionality of the remaining acres (Barbour, 2006). Importantly, their elevations have in many instances been reduced to near sea level and vegetative cover has been greatly reduced. The majority of permanent landloss (conversion to open water) occurred from what appears to be bare to slightly vegetated soil, with the exception of Petit Bois Island, which lost mostly denser vegetation (USDOC, NMFS, 2007c).

Alabama

Portions of the barrier islands along the Alabama coast suffered from wind- and water-induced erosion as a result of the storm surge from Hurricane Katrina. The majority of the damage was on Isle Aux Herbes, a barrier island in Mississippi Sound on the southwest coast of Alabama. A biological survey report prepared for the Mobile Bay Estuary Program (Heck and Byron, 2006) indicated that land loss had occurred on the island as a result of shoreline erosion. Vegetative debris from the storm event was also piled on some areas of the island. These barrier island beaches were important as sea turtle nesting sites. The FWS (USDOI, FWS, 2005) reported that about 50 sea turtle nests were lost along the Alabama coast. All 10 nests at the Bon Secour NWR were destroyed.

Florida

The storm surge from Hurricane Katrina caused minor beach erosion (loss of 1-3 ft or 0.3-0.9 m of beach or dune profile) along the south-facing shorelines of Dade and Monroe Counties in Florida (FDEP, 2005). Hurricane Wilma, in addition to impacting the State directly, exposed the Florida Keys' north-facing beaches from Key West to Lower Matecumbe Key and Curry Hammocks State Park to storm surge, flooding, and moderate (3- to 10-ft or 0.9- to 3-m vertical loss) to major (>10 ft or 3 m) beach erosion (FDEP, 2005). Major beach erosion is defined as the lowering of a beach profile with recession of dune vertical scarp >10 ft (3 m) or that the dunes are totally removed (FDEP, 2005). The island at Pelican Shoal Critical Wildlife Area (5 mi or 8 km south of Boca Chica Key) washed away. At Cape Sable, Hurricane Wilma devastated carbonate and shell beaches (FDEP, 2005). From Cape Sable northward along the west Florida coast to Sea Oat Island in Collier County, beach erosion also was major (FDEP, 2006).

In summary, the barrier islands throughout the Gulf of Mexico have all experienced varying degrees of erosion, land and vegetation loss, loss in elevation or beach profile, and in some cases movement toward shore as a result of previous highly active hurricane seasons.

4.1.3.1.2. Impacts of Routine Events

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA or WPA proposed action on the coastal barriers and beaches is presented in Chapters 4.2.2.1.3.1 and 4.2.1.1.3.1 of the Multisale EIS, respectively. The following information is a summary of the impact analysis incorporated from the Multisale EIS that generally addresses the impacts of a proposed action. Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, it is unlikely that routine activities associated with the offshore exploration and drilling would affect these nearshore beaches or barrier islands.

The routine impact-producing factors associated with a proposed action that could affect these environments include vessel traffic, maintenance dredging of navigational canals, and pipeline installation.

CPA Proposed Action Analysis

Effects on coastal barrier beaches and dunes as a result of channel maintenance or dredging related to a CPA proposed action are expected to be restricted to minor and very localized areas downdrift of the channel. If adverse impacts do occur as a result of any necessary channel maintenance, dredging of navigational channels can be mitigated by discharging dredged materials onto barrier beaches or strategically into longshore sediment currents downdrift of maintained channels or by using the dredged material for wetland creation or beach restoration.

A maximum of one new pipeline landfall is projected as a result of a CPA proposed action, even with the addition of the 181 South Area. Should a pipeline landfall occur in the immediate vicinity of a barrier island, the use of modern technologies, such as directional boring, would greatly reduce and perhaps eliminate impacts to coastal barrier islands and beaches. Therefore, the effects on barrier beaches and dunes from pipeline-laying activities associated with a CPA proposed action are expected to be minor or nonexistent. These impacts are considered to be negligible.

There are 0-1 gas processing plants projected to be constructed as a result of a CPA proposed action. Should one be constructed, it will most likely be in Louisiana, where the large majority of the infrastructure exists for receiving oil and gas from the CPA. No gas processing facilities would be constructed on barrier beaches. Effects on coastal barrier beaches and associated dunes associated with construction of a gas processing plant from a CPA proposed action are expected to be restricted to minor and very localized areas downdrift of the channel.

There is an expected increase in vessel traffic and helicopter support due to the addition of the 181 South Area. This increased activity is not expected to require construction or expansion of onshore infrastructure. Port Fourchon and the armored navigation channels leading to the support-vessel bases are not expected to experience any increase in erosion as a result of the additional vessel trips required to support activity in the 181 South Area. For the near future, Port Fourchon would continue to be the primary base for both vessel and helicopter support for the CPA including the 181 South Area. In the long term, it is possible that coastal Alabama (Mobile, Theodore), Mississippi (Pascagoula), and Venice and Gagliano, Louisiana, may be used as support bases. Depending on the routing, number, and proximity of the existing navigation channels and sea lanes to the various barrier islands along these coasts, some potential may exist for erosion. This erosion potential cannot be determined until the exact locations of these additional locations are identified. At present, the average contribution of a CPA proposed action to OCS-related vessel traffic in navigation canals is expected to be small (2-3%). Turner and Cahoon (1988) found that OCS traffic in general comprises a relatively small percentage (~12%) of the total commercial traffic using navigation channels. Thus, the allocation of navigation channel impacts to OCS activities is small, and the contribution from a proposed action is even smaller. The erosion of coastal barrier beaches and associated dunes from vessel traffic associated with a CPA proposed action are expected to be negligible, especially considering OCS operations primarily staged from armored channels like Port Fourchon.

WPA Proposed Action Analysis

A proposed action will use existing navigation channels, which would require normally scheduled maintenance. Dredged material placement will be used for beach and marsh restoration where feasible. No dredged material will be placed on the barrier islands unless the action is restorative in nature. Port Fourchon is one of the primary vessel-based support base for the WPA. Since the navigation channels in this area are armored, the projected vessel traffic required for OCS in the WPA is not expected to increase channel erosion in the area. Lower post-storm elevations of several of the barrier islands have made them more susceptible to overtopping and increased erosion potential (USDOC, NMFS, 2007a). Because of this change in barrier island topography, there may be some indirect impacts due to sediment contributions from the eroding areas of these islands near a channel or sea lane.

A maximum of one new pipeline landfall is expected to be constructed for each WPA proposed action. Should a pipeline landfall occur in the immediate vicinity of a barrier island, the use of modern technologies, such as directional boring, would greatly reduce and perhaps eliminate the impacts to coastal barrier islands and beaches. These impacts are considered to be negligible.

The use of existing gas processing facilities built inland may, through natural storm-driven erosion and shoreline recession, be located in the barrier beach and dune zone and may contribute to the erosion. A WPA proposed action may contribute to the extended use of these facilities. There are 0-1 gas processing plants projected to be constructed as a result of a WPA proposed action. No gas processing facilities would be constructed on barrier beaches.

Channel and inlet maintenance, as well as erosion protection works (jetties) required to assure access to the production and supply facilities, may contribute to minor and localized impacts on adjacent barrier beaches due to sediment deprivation. This would be most likely in the sediment-starved coasts of Louisiana. Based on use, a WPA proposed action would account for a very small percentage of these impacts, which would occur whether a proposed action is implemented or not. In conclusion, a WPA proposed action is not expected to adversely alter barrier beach configurations significantly beyond existing, ongoing impacts in very localized areas downdrift of artificially jettied and maintained channels.

Summary and Conclusion

The routine activities associated with a CPA or WPA proposed action that would impact barrier island beaches or their associated dunes include pipeline installation, construction or maintenance of navigation channels (dredging), navigation channel use (vessel traffic), and construction or expansion of oil- and gas-related infrastructure. Impacts are expected to be restricted to temporary and localized disturbances. Due to the proximity of the 181 South Area (130 mi or 209 km offshore) to the barrier islands and beaches, it is unlikely that routine activities associated with this area would affect these nearshore beaches or barrier islands.

The potential exists for modifications to channel training structures (jetties) to extend the life of onshore production facilities if necessary. Since these protective structures and onshore facilities are not located on barrier islands or barrier inlets and the magnitude of the work required to facilitate the proposed action, if needed, is minimal, no impact to barrier islands or beaches are expected as a result.

Existing facilities originally built inland may, through natural erosion and shoreline recession, be located in the barrier beach and dune zone and may contribute to erosion there. A proposed action may contribute to the continued use of such facilities. Maintenance dredging of barrier inlets and bar channels is expected to occur, which, combined with channel jetties, generally causes minor and very localized impacts on adjacent barrier beaches downdrift of the channel due to sediment deprivation. The worst of these situations is found on the sediment-starved coasts of Louisiana where sediments are largely organic. Based on use, a CPA or WPA proposed action would account for a very small percentage of these impacts, which would occur whether a proposed action is implemented or not. Up to one processing plant and up to one new pipeline landfall are projected for a CPA and WPA proposed action. The avoidance of activities on barrier islands, as well as modern construction technologies, such as directional boring, would greatly reduce and perhaps eliminate impacts to coastal barrier islands and beaches.

The MMS has reexamined the analysis for barrier islands and beaches presented in the Multisale EIS. Based on the additional information presented above, a CPA or WPA proposed action is not expected to adversely alter barrier beach configurations beyond existing, ongoing impacts in very localized areas downdrift of artificially jettied and maintained channels. A CPA or WPA 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 can mitigate adverse impacts upon those localized areas. No significant new information was found that would alter the overall conclusions that impacts to barrier islands and beaches from routine activities associated with a CPA or WPA proposed action would be minimal.

4.1.3.1.3. Impacts of Accidental Events

Background/Introduction

A detailed description of accidental impacts upon barrier beaches and dunes can be found in Chapter 4.4.3.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since its publication.

Accidental impacts associated with a CPA or WPA proposed action that could adversely affect barrier islands and beaches include oil spills associated with the transport and storage of oil (Chapter 4.3.1 of the Multisale EIS). Inland spills have the greatest potential for affecting the coastal barrier resources due to their proximity to the resources. Inland spills resulting from damage to pipelines, vessel collisions, malfunctions of onshore production or storage facilities, or blowouts have the greatest potential for contacting the barrier and mainland beach resources. The impact from these oil spills depends on the geographic location of the spill, volume, rate of spill, type of oil, oil-slick characteristics, oceanic conditions at the time of the spill, season, and oil-spill response and cleanup preparedness. Coastal spills in offshore coastal waters or in the vicinity of Gulf tidal inlets present a greater potential risk to barrier beaches because of their close proximity. Inland spills that occur away from Gulf tidal inlets are generally not expected to significantly impact barrier beaches and dunes.

Impacts to the general vegetation and physical aspects of coastal environments by oil spills and cleanup response activities resulting from a CPA or WPA proposed action are considered in Chapters 4.4.3.1, 4.4.3.2, and 4.4.3.3 of the Multisale EIS. Potential impacts from oil spills to barrier islands seaward of the barrier-dune system are considered in the coastal barrier beaches and associated dunes analysis. Potential impacts to barrier islands landward of the barrier-dune system are considered in Chapter 4.1.3.2 of the Multisale EIS. The types and sources of spills that may occur, their dissipation prior to contacting coastal resources, spill-response activities, and mitigation are described in Chapter 4.3.1 of the Multisale EIS.

No significant impacts to the physical shape and structure of barrier beaches and associated dunes are expected to occur as a result of accidental events associated with a CPA or WPA proposed action. Although a resulting slick may cause beach oiling, equipment and personnel used to clean up an oil spill may generate the greatest direct 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.

Should a spill contact a barrier beach, oiling is expected to be light and sand removal during cleanup activities minimized. However, the protection previously afforded the mainland beaches and the barrier islands and their associated wetlands pre-Katrina has been reduced. Hurricanes Katrina and Rita reduced barrier island elevations, removed significant areas of vegetation, eroded channels, and in some cases reduced the land mass (Chandeleur Island area reduced by 50%) of barrier islands along the Louisiana, Mississippi, and Alabama coasts (USDOC, NMFS, 2007a). In Mississippi, the overall size and elevation were reduced significantly by 15 percent (USDOC, NMFS, 2007a). The northeast Texas coast lost 1 ft (0.3 m) in elevation and retreated 98 ft (30 m) from 2001 to 2005 (USDOC, NMFS, 2007a). Due to the now more gentle slopes and in some cases cuts into the mainland barrier beaches left by the storms, more of the transition zone between the water and beach ridge may be more vulnerable to spills. In some areas along the Louisiana coast, barrier islands were severely damaged either by heavily degrading beachfront elevations and beach ridges or by completely overtopping the islands by either removing or completely redistributing the sediments on the island so that the island becomes submerged.

CPA Proposed Action Analysis

Barrier islands and beaches adjacent to the CPA are restricted to the coastal waters of Louisiana, Mississippi, and Alabama. The greatest threat to the barrier island and beach resources would be from inland oil spills. Based on the assumption that spill occurrence is proportional to the volume of oil handled, sensitive coastal environments in eastern Louisiana, from Atchafalaya Bay to east of the Mississippi River, including Barataria Bay, have the greatest risk of being contacted by spills from operations related to a CPA proposed action. Spills that could occur in coastal waters from support operations associated with a CPA proposed action over its 40-year life are estimated at 46-102 spills.

As explained in Chapter 3.2.1 of this SEIS, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the number of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. Activity that would result from the addition of the 181 South Area would cause a negligible increase in the risk of a large spill occurring and contacting barrier islands and beaches. If oil should reach the beaches from this distance, it would be sufficiently weathered and detoxified through biodegradation, mixing, and the weathering process.

The probabilities of an offshore spill ≥1,000 bbl occurring and contacting environmental features are described in Chapter 4.3.1.8 of the Multisale EIS. Eight parishes in Louisiana and two counties in Texas have a chance of spill contact that is >0.5 percent. For these parishes and counties, the chance of an OCS offshore spill ≥1,000 bbl ranges from 1 to 16 percent. In Louisiana, the Deltaic Plain area has the highest risk from a CPA proposed action (Chapter 4.3.1 of the Multisale EIS). Except for two accidental 3,000-bbl spills estimated to occur in Louisiana and Texas coastal waters under the high resource-estimate scenario over the 40-year life of a proposed action, MMS estimates that coastal spills ≥1,000 bbl resulting from a CPA proposed action will have a low probability of occurrence.

Approximately 61-136 spills are estimated to occur within Gulf coastal waters from activities supporting the CPA and WPA proposed actions, over their 40-year life, combined. Most (about 90%) of these spills would be ≤1 bbl. The most likely locations of the estimated 6-15 coastal spills >1 bbl would be proximate to the major oil pipeline or shore facilities.

Sensitive coastal environments in eastern Louisiana, from Atchafalaya Bay to east of the Mississippi River, including Barataria Bay, have the greatest risk of being contacted by spills from operations related to a CPA proposed action. The greatest risk of contact would be from the assumed 3,000-bbl spill should it occur within or near wetlands. Should a spill contact a barrier beach, oiling is expected to be light and sand removal during cleanup activities minimized. No significant impacts to the physical shape and structure of barrier beaches and associated dunes are expected to occur as a result of a CPA proposed action.

WPA Proposed Action Analysis

The barrier islands in the WPA are located primarily along the northeast coast of Texas (Chapter 3.2.1.1 of the Multisale EIS) and, in general, are characterized by higher elevations and steeper shoreline beaches with elevated dune systems. These physical characteristics make these island beaches and the wetlands associated with the back beach areas less susceptible to oil spills. However, depending on the volume and proximity of inland or coastal spills to these beach resources, beach oiling could occur. With proper spill management and the use of proper cleanup techniques, the effects can be minimized and temporary.

Because of the proximity to barrier islands and beaches, inshore spills pose the greatest threat. Inshore vessel collisions may release fuel and lubricant oils, and pipeline ruptures may release crude and condensate oil. The Galveston/Houston/Texas City area has the greatest risk of experiencing coastal spills related to a WPA proposed action. Spills that could occur in coastal waters from a proposed action support operations are estimated at 15-34 spills for a WPA proposed action over its 40-year life.

Offshore oil spills that occur in the proposed action areas are much less likely to contact barrier island and beach resources than inshore spills. The probabilities of an offshore spill ≥1,000 bbl occurring and contacting environmental features are described in Chapter 4.3.1.8 of the Multisale EIS. Six counties in Texas and one parish in Louisiana have a chance of spill contact that is >0.5 percent. For these counties and parish, the chance of an OCS offshore spill ≥1,000 bbl occurring and reaching the shoreline ranges from 1 to 5 percent as the result of a proposed action over its 40-year life.

Should a spill contact a barrier beach, oiling is expected to be light and sand removal during cleanup activities minimized. No significant impacts to the physical shape and structure of barrier beaches and associated dunes are expected to occur as a result of a WPA proposed action.

Summary and Conclusion

Because of the proximity to barrier islands and beaches, inshore spills pose the greatest threat. Such spills may result from either vessel collisions that release fuel and lubricants or from pipelines that rupture. Most of the estimated number of nearshore spills are smaller in volume and would weather quickly. Should a nearshore spill occur, these impacts would be considered short term in duration and minor in scope. Although a resulting slick may cause beach oiling, equipment and personnel used to clean up an oil spill may generate the greatest direct 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.

The MMS has reexamined the analysis for barrier island and beach resources presented in the Multisale EIS, based on the additional information presented above. The most current information did reveal that some of the barrier islands had experienced storm-induced reductions in beach shoreline elevations and erosion (USDOC, NMFS, 2007a). While this information may indicate some reduction in the protection provided by the affected barrier islands, the significance of this loss of protection is small in comparison with the overriding climatic forces. Therefore, this information would not alter the overall conclusion that impacts on barrier islands and beaches from accidental impacts associated with a CPA or WPA proposed action would be minimal.

The addition of the 181 South Area would not pose a significant increase in risk to barrier island or beach resources.

4.1.3.1.4. Cumulative Impacts

Background/Introduction

A detailed description of cumulative impacts upon barrier beaches and associated dunes can be found in Chapter 4.5.3.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

This cumulative analysis considers the effects of impact-producing factors related to a 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, oil spills, oil-spill response and clean up activities, pipeline landfalls, navigation channels, development and urbanization, natural processes, potential for nearshore salinity modifications (preparation of salt domes for oil storage), tourism and recreational activities.

River Channelization and Beach Protection

In the CPA, channel deepening and widening along the Mississippi River and other major coastal rivers, in combination with channel training and bank stabilization work, has resulted in the reduced delivery of sediment to the eroding deltas along the rivers' mouths. This reduction in sediment not only impedes delta building but also fails to provide the needed sediment transport required for nourishment of the eroding offshore barrier islands and their beaches. This, coupled with beach building and stabilization projects utilizing mined sands, jetties, groins, and other means of sediment capture, are depriving natural restoration of the barrier beaches normally accomplished through sediment nourishment and sediment transport.

In the WPA, the Texas coast has experienced a natural decrease in sediment supply as a result of climatic changes (e.g., diminished rainfall, etc.) that have occurred during the past few thousand years (Morton, 1982) and dam construction, both of which have resulted in the loss of sediment and sediment transport. Seawall construction along eroding stretches of islands has reduced the amount of sediment introduced into the littoral system by shore erosion. The Texas Chenier Plain used reworked sediments from the Mississippi River depositions, which are now decreased by beach and channel stabilization work, as well as flood protection works. Reductions in sediment supply along the Texas coast will continue to have a significant adverse impact on barrier landforms there. Subsidence, erosion, and dredging of inland coastal areas and the concurrent expansion of tidal influences, particularly as seen in Louisiana, continually increases tidal prisms around the Gulf. These changes may result in the opening and deepening of many new tidal channels that connect to the Gulf or inland waterbodies. These incremental changes will cause adverse impacts to barrier beaches and dunes. Efforts to stabilize the Gulf shoreline have adversely impacted barrier landscapes in Louisiana and Texas. Large numbers and varieties of stabilization techniques, such as groins, jetties, and seawalls, as well as artificially-maintained channels and jetties, installed to stabilize navigation channels have been applied along the Gulf Coast. These efforts have contributed to coastal erosion by depriving downdrift beaches of sediments, which accelerates erosion there (Morton, 1982), and by increasing or redirecting the erosional energy of waves. Over the last 20 years, dune and beach stabilization have been better accomplished by using more natural applications such as sand dunes, beach nourishment, and vegetative plantings.

Natural Processes

Barrier beaches along coastal Louisiana have experienced severe erosion and landward retreat (marine transgression) because of natural processes enhanced by human activities. Adverse effects on barrier beaches and dunes have resulted from changes to the natural dynamics of water and sediment flow along the coast while trying to control catastrophic floods and change the natural environment to better accommodate navigation on waterways used to support OCS and non-OCS seaborne traffic. Sea-level rise and coastal subsidence, in combination with tropical and extra-tropical storms, exacerbate and speed up the erosion of coastal barrier beaches along the Gulf Coast of Louisiana in the CPA. Both the western edge of the CPA along the western Louisiana coast as well as the eastern Texas coast in the WPA all received major damage as a result of Hurricanes Katrina and Rita. Hurricane Rita in September 2005 severely impacted the shoreface and beach communities of Cameron Parish in southwest Louisiana and the southeast Texas coast. Some small towns in the western portion of the CPA area have no standing structures remaining. A storm surge approaching 6 m (20 ft) caused beach erosion and overwash, which flattened coastal dunes, depositing sand and debris well into the backing marshes. These barriers both lost elevation and vegetative cover as a result of the erosion forces accompanying the storm surge and scour from storm-driven debris (Barras, 2007a). The removal of vegetative cover and scour scars that accompanies these over toppings as a result of storm surges also provides an avenue for additional erosion to occur as a result of inlet formations and tidal rivulets. These modifications to the topography on these islands may result in hydrological changes that enable further sediment transport from the islands, providing pathways for further erosion and saltwater intrusion into the islands' less salt-tolerant, interior vegetated habitats.

The barrier islands of Texas underwent similar significant erosion and loss of dune elevation as a result of Hurricane Rita (USDOC, NMFS, 2007a). This loss of elevation, combined with the shoreline retreat and removal of vegetation further aggravated by the hurricanes, allowed for the expansion of the overwash zone, lessening the pre-storm protection provided by these barrier islands. This reduction in island elevation results in less frontline protection to valuable marshes within the McFaddin Complex and also makes urban and industrial areas protected by these marshes more at risk (USDOC, NMFS, 2007a).

Navigation Channels, Vessel Traffic, and Pipeline Emplacements

The effects to coastal barrier beaches and associated dunes from pipeline emplacements, navigation channel use and dredging, and the construction or continued use of infrastructure in support of a CPA or WPA proposed action are expected to be restricted to temporary and localized disturbances. The 0-1 pipeline landfalls projected in support of a CPA or WPA proposed action are not expected to cause significant impacts to barrier beaches because of the use of non-intrusive installation methods. The 0-1 gas processing plants would not be expected to be constructed on barrier beaches. Existing facilities originally built inland may, through natural erosion and shoreline recession, be located in the barrier beach and dune zone and contribute to erosion there. A proposed action may contribute to the continued use of such facilities. Maintenance dredging of barrier inlets and bar channels is expected to occur, which, combined with channel jetties, generally causes minor and very localized impacts on adjacent barrier beaches downdrift of the channel due to sediment deprivation. The worst of these situations is found on the sediment starved coasts of Louisiana, where sediments are largely organic. Based on use, a proposed action would account for a very small percentage of these impacts, which would occur whether a proposed action is implemented or not. The proposed action is not expected to adversely alter barrier beach configurations significantly beyond existing, ongoing impacts in very localized areas downdrift of artificially jettied and maintained channels. A CPA proposed action may extend the life and presence of facilities in eroding areas, which would accelerate erosion in those areas. The strategic placement of dredged material from channel maintenance, channel deepening, and related actions can mitigate adverse impacts upon those localized areas. With the established importance of barrier islands as frontline protection for both coastal wetlands and mainland infrastructure, there are no current or future plans for routing navigation channels (if needed) through barrier islands.

While vessel traffic may cumulatively increase over the life of the estimated 40-year period of OCS exploration, it is doubtful that this increase in cumulative numbers is sustainable since some older wells will be coming out of service as new wells come into service. This being the case, there should not be a sustainable cumulative increase in the need for supply and support vessels over time since vessel traffic would either decrease or reach a balance to meet the needs of the working wells. The entire current OCS Program accounts for only 12 percent of the commercial ship traffic. The additional amount added by a WPA proposed action accounts for 4.5-5.7 percent of the OCS Program's usage and 0.5-0.7 percent of the total commercial usage. The CPA proposed action accounts for 2.5-4.1 percent of the OCS Program and 0.3-0.5 percent of the total commercial traffic. Further details concerning vessel traffic can be found in Chapters 4.2.1.1.3.2, 4.2.2.1.3.2, and 4.1.1.8.4 of the Multisale EIS. Navigation channels projected to be used in support of a CPA or WPA proposed action are discussed in Chapter 4.1.2.1.9 of the Multisale EIS.

Oil Spills

Sources and probabilities of oil entering waters of the Gulf and surrounding coastal regions are discussed in Chapter 4.1.3.4 of the Multisale EIS. Inland spills that do not occur in the vicinities of barrier tidal passes are more likely to contact the landward rather than the ocean side of a barrier island. Hence, no inland spills are expected to significantly contact barrier beaches (Chapters 4.2.1.1.3.1 and 4.2.2.1.3.1 of the Multisale EIS).

Most spills occurring in offshore coastal waters are assumed to proportionally weather and dissipate similar to the weathering described in Tables 4-36 and 4-37 of the Multisale EIS. Dispersants are not expected to be used in coastal waters. The weathering model described in Chapter 4.3.5 of the Multisale EIS attributes the dispersal of about 65 percent of the volume of a spill to the use of dispersants. No calculation has been made to estimate how much oil might be deposited on a beach if dispersants are not used. Unfavorable winds and currents would further diminish the volume of oil that might contact a beach. A persistent, northwesterly wind might preclude contact. As discussed in Chapters 3.2.1.1, 4.2.1.1.3.1, 4.2.2.1.3.1, and 4.3.1.8 of the Multisale EIS, the probability that tide levels could reach or exceed the elevations of sand dune vegetation on barrier beaches ranges from 0 to 16 percent, depending on the particular coastal setting and the elevation of the vegetation. The strong winds that would be needed to produce unusually high tide levels would also disperse the slick over a larger area than is being considered in the current analysis. The probabilities of spill occurrence and contact to barrier beaches and sand-dune vegetation are considered very low. Hence, contact of sand-dune vegetation by spilled oil is not expected to occur. Furthermore, the Mississippi River discharge would help breakup a slick that might otherwise contact Plaquemines Parish. The spreading would reduce the oil concentrations contacting the beach and vegetation, greatly reducing impacts on vegetation.

The barrier beaches of Deltaic Louisiana have the greatest rates of erosion and landward retreat of any known in the western hemisphere, and among the greatest rates on earth. Long-term impacts to contacted beaches from these spills could occur if significant volumes of sand were removed during cleanup operations. Removing sand from the coastal littoral environment, particularly in the sand-starved transgressive setting of coastal Louisiana, could result in accelerated coastal erosion. Spill cleanup is difficult in the inaccessible setting of coastal Louisiana. This analysis assumes that Louisiana would require the responsible party to clean the beach without removing significant volumes of sand or to replace the sand removed. Hence, cleanup operations are not expected to cause permanent effects on barrier beach stability. Within a few months, adjustments in beach configuration may result from the disturbance and movement of sand during cleanup.

The results of an investigation on the effects of the disposal of oiled sand on dune vegetation in Texas showed no deleterious impacts on existing vegetation or colonization of the sand by new vegetation (Webb, 1988). Hence, projected oil contacts to small areas of lower elevation sand dunes are not expected to result in destabilization of the sand dune area or the barrier landform.

Some oil will penetrate to depths beneath the reach of the cleanup methods. The remaining oil would persist in beach sands, periodically being released when storms and high tides resuspend or flush through beach sediments. During hot, sunny days, tarballs buried near the surface of the beach sand may liquefy and cause a seep to the sand surface. The long-term stressors, including physical effects and chemical toxicity of hydrocarbons, may lead to decreased primary production, plant dieback, and hence further erosion (Ko and Day, 2004).

Recreational Use and Tourism

Most barrier beaches in the CPA are relatively inaccessible for recreational use because they are either located a substantial distance offshore, as in Mississippi, or in coastal areas with limited road access, as in Louisiana. Few beaches in the CPA have been, or are likely to be, substantially altered to accommodate recreational or industrial construction projects in the near future.

Most barrier beaches in Texas, Alabama, and Florida are accessible to people for recreational use because of road access, and their use is encouraged. The Texas Open Beaches Act (1959) guarantees the public's right to unimpeded use of the State's beaches. It also provides for public acquisition of private beach-front property. Recreational use of barrier beaches and dunes can have impacts on the stability of the landform. Vehicle and pedestrian traffic on sand dunes can stress and reduce the density of vegetation that binds the sediment and stabilizes the dune. Destabilized dunes are more easily eroded by winds waves and traffic. Judd et al. (1988) documented that as much as 18 percent of the total dune area along parts of South Padre Island had experienced damage from vehicular traffic. Recreational vehicles and even hikers have been problems where road access is available and where the beach is wide enough to support vehicle use, as in Texas, Alabama, Florida, and a few places in Louisiana. Areas without road access will have very limited impacts by recreational vehicles. The CPA and WPA proposed actions would not provide any additional access that would result in an additive cumulative impact to the barrier beaches and dunes.

Summary and Conclusion

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 barrier system of coastal Mississippi and Alabama is well supported on a coastal barrier platform of sand. The Texas coast has experienced landloss because of a decrease in the volume of sediment delivered to the coast because of dams on 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.

Beach stabilization projects are considered by coastal geomorphologists and engineers to accelerate coastal erosion. Beneficial use of maintenance dredged materials could be required to mitigate some of these impacts.

The impacts of oil spills from both OCS and non-OCS sources to the sand-starved Louisiana coast should not result in long-term alteration of landform if the beaches are cleaned using techniques that do not significantly remove sand from the beach or dunes. The barrier beaches of deltaic Louisiana, the Chenier Plain, and the region around Galveston have the greatest risks of sustaining impacts from oil-spill landfalls because of their very high concentrations of oil production near those coasts. 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 cleanup operations. Some contact to lower areas of sand dunes is expected. These contacts would not result in significant destabilization of the dunes. The long-term stressors to barrier beach communities caused by the physical effects and chemical toxicity of an oil spill may lead to decreased primary production, plant dieback, and hence further erosion.

Under the cumulative scenario, 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. Existing pipelines, in particular those that are parallel and landward of beaches, that had been placed on barrier islands using older techniques that left canals or shore protection structures have caused and will continue to cause barrier beaches to narrow and breach.

Recreational use of many barrier beaches in the Western Gulf is intense because of their accessibility by road. Because of the inaccessibility of most of the Central Gulf barrier coast to humans, recreational use is not expected to result in significant impacts to most beaches. Federal, State, and local governments have made efforts over the last 10 years to slow the landward retreat of Louisiana's Gulf shorelines.

In conclusion, 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 as well as 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.

A CPA or WPA proposed action is not expected to adversely alter barrier beach configurations significantly beyond existing, ongoing impacts in very localized areas downdrift of artificially jettied and maintained channels. A 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 can mitigate adverse impacts upon those localized areas. Thus, the incremental contribution of a proposed action, including the 181 South Area, to the cumulative impacts on coastal barrier beaches and dunes is expected to be very small.

4.1.3.2. Wetlands

The MMS has reexamined the analysis for wetlands presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for wetlands presented in the Multisale EIS. Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, the area has little potential for direct impact to coastal wetlands as a result of the proposed activities in that area.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Effects to coastal wetlands from the primary impact-producing activities associated with a CPA or WPA proposed action are expected to be low. The primary impact-producing activities associated with routine activities for a proposed action that could affect wetlands include pipeline emplacement, construction and maintenance, navigational channel use (vessel traffic) and maintenance, disposal of OCS-related wastes, and use and construction of support infrastructure in these coastal areas. Vessel traffic associated with a proposed action is expected to contribute minimally to the erosion and widening of navigation channels and canals. Deltaic Louisiana is expected to continue to experience the greatest loss of wetland habitat. Wetland loss is also expected to continue in coastal Texas, Mississippi, Alabama, and Florida, but at slower rates. The incremental contribution of a proposed action to the cumulative impacts on coastal wetlands is expected to be very small.

Routine activities in the CPA and WPA such as pipeline emplacement, navigational channel use, maintenance dredging, disposal of OCS wastes, and construction and maintenance of OCS support infrastructure in coastal areas are expected to result in low impacts. Indirect impacts from wake erosion and saltwater intrusion are expected to result in low impacts, which are indistinguishable from direct impacts from inshore activities. The potential impacts from accidental events, primarily oil spills, are anticipated to be minimal. The incremental contribution of a proposed action's impacts to the cumulative impacts to wetlands is small and expected to be negligible.

4.1.3.2.1. Description of the Affected Environment

A detailed description of various wetland types, processes, functions, and importance can be found in Chapter 3.2.1.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

Coastal wetland habitats occur as bands around waterways; broad expanses of saline, brackish, and freshwater marshes; mud and sand flats; and forested wetlands of cypress-tupelo swamps and bottomland hardwoods. Saline and brackish habitats support sharply delineated, segregated stands of single plant species, while fresh and very low salinity environments support more diverse and mixed communities of plants. High organic productivity and efficient nutrient recycling are characteristic of coastal wetlands. They provide habitats for a great number and wide diversity of resident plants, invertebrates, fishes, reptiles, birds, and mammals. They are also important nursery grounds for many economically important fishes and shellfish juveniles. The marsh edge, where marsh and open water meet, is particularly important for its higher productivity and greater concentration of organisms. Emergent plants produce the bulk of the energy that supports salt-marsh dependent animals.

A search was conducted for new information related to coastal wetlands published since completion of the Multisale EIS. An Internet search for relevant scientific journal articles was conducted using a publicly available search engine. The journals of *Environmental Management, Estuaries, and Journal of Wetland Science*, along with the websites for Federal and State agencies, were reviewed for newly released information. The USGS Open File reports by Barras (2006) concerning post-Katrina/Rita land changes in coastal Louisiana were reviewed for new information, as were the FWS Wetlands Status and Trends website, the Louisiana Coast website, and the Louisiana Coastal Restoration Program website. In addition to website reviews, interviews were conducted with key personnel from the Texas Department of Economic Geology, Texas General Land Office, Texas Parks and Wildlife, and USGS concerning additional information on wetland loss in their particular area of work. The NMFS report to Congress (USDOC, NMFS, 2007a), prepared in July 2007, addressed the impacts of Hurricanes Katrina, Rita, and Wilma on fishery habitat (including wetlands). This report was reviewed for information pertinent to wetland loss and will be summarized later in this section.

Louisiana

Wetland loss rates in coastal Louisiana are well documented to have been as high as 10,878 ha/yr (42 mi^2/yr) during the late 1960's. Studies have shown that the landloss rate in coastal Louisiana for the period 1972-1990 slowed to between an estimated 6,475 ha/yr (25 mi^2/yr) (Louisiana Coastal Wetlands Conservation and Restoration Task Force, 1993) and 9,072 ha/yr (35 mi^2/yr) (USDOI, GS, 1998). Over the next 50 years, Louisiana is projected to lose almost 17 mi^2 (4,403 ha) of coastline each year due to storms, sea-level rise, and land subsidence (GAO, 2007).

A recent evaluation of landloss rates using consistent data suggests that landloss is not occurring as rapidly as previously estimated and that it actually has been relatively stable after the 1970's through 2004 (Barras et al., 2008). Barras et al. (2008) indicates that, for the period 1985-2004, the majority of the coastal landloss occurred on the Deltaic Plain at a rate of 3,885-4144 ha/yr (15-16 mi^2/yr). For the same period, the Marginal Deltaic Plain showed a slight increase in land at a rate of 155 ha/yr (0.6 mi^2/yr) as a result of the growth of the Atchafalaya River and Wax Lake Delta Complexes, while the Chenier Plain loss rate remained fairly stable at 518 ha/yr (2 mi^2/yr). The overall rate of coastal landloss between 1985 and 2004 was approximately 3,108 ha/yr (12 mi^2/yr). Annual rates of coastal landloss for 1985-

2006 increased 777 ha/yr (3 mi^2/yr) to 3,885 ha/yr (15 mi^2/yr), relative to the 1985-2004 trends. This 777 ha/yr (3 mi^2/yr) increase reflects the hurricane-induced acceleration of landloss.

To demonstrate the effects of Hurricanes Katrina and Rita, the study also analyzed the loss rates between 2004 and 2006. During this period, water areas (indicates landloss) increased coastwide by 51,282 ha (198 mi^2), the equivalent of 70 percent of the cumulative loss from 1978 to 2004. Hurricanes Katrina and Rita increased water area (indicating landloss) in coastal Louisiana by 56,720 ha (219 mi^2) between 2004 and 2005. However, between 2005 and 2006 some flooded areas drained and some burned marshes recovered, thus increasing the land base by 5,439 ha (21 mi^2) in that short period of time. The land gain between 2005 and 2006 is equal to approximately 10 percent of the landloss (56,203 ha; 217 mi^2) estimated for 2004-2005 (Barras, 2006).

Pipelines and Navigation Canals

The MMS-funded study, *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* (Johnston et al., 2007), was recently published. The purpose of the study was to determine the direct and indirect effects of existing OCS-related pipelines and navigation canals on landloss and wetland habitat change. Preliminary data from this study was included in the Multisale EIS. The following is a summary of the study.

Spatial analyses revealed that landloss was consistently higher in the vicinity of pipelines compared with more general, regional trends of landloss. The locations of OCS-related pipelines and navigation canals were associated with enhanced loss, suggesting that they contributed to the loss. However, the analysis was not able to disassociate trends uniquely related to pipeline or canal impacts from larger, regional trends related to a host of other contributing variables, such as other human activities or natural causes.

Annual rates of landloss within 150 m (492 ft) to either side of OCS-related pipelines were highest in Louisiana, lowest in the Mississippi/Alabama coastal plain, and intermediate in Texas. Higher rates in Louisiana may be due to higher concentrations of pipelines and higher rates of subsidence. Direct impacts from pipelines were found to increase with the diameter and age of pipelines. However, recently built pipelines and pipeline canals are much narrower than in the past because of advances in technology and improved methods of installation due to a greater awareness among regulatory agencies and industry.

The study also looked at the dominant techniques used to construct and mitigate OCS-related pipelines and navigation canals effective in minimizing their effects on landloss, wetland loss, and habitat change. It was found that the magnitude of impacts from OCS-related pipelines described is inversely proportional to the quantity and quality of mitigation techniques applied. Pipelines with extensive mitigation measures appeared to have minimal impacts, while pipelines not backfilled and/or that had spoil banks remaining after construction attributed to significant habit changes. Through proper construction methods, mitigation, and maintenance, impacts can be minimized or altogether avoided.

There were strong spatial trends in habitat change within 500 m (1,640 ft) to either side of OCS-related navigation channels from the 1950's to the 1990's in Louisiana and Texas, with minor changes in the Mississippi/Alabama coastal plain. Navigation canals had significant habitat impacts on the landscape, including significant widening. The study did not look at saltwater intrusion as a result of canals. A reduction of widening in recent years was noted, likely as a result of more aggressive management and the restoration of the canal edges to prevent erosion. Results indicate that management activities, including erosion protection and restoration along the edges of these canals, can significantly reduce canal-widening impacts on wetland loss. Besides the direct, uncontrollable impacts of a functioning navigation canal (i.e., saltwater intrusion), additional impacts can be mitigated with bank stabilization, and where possible, the beneficial use of dredged material (produced during maintenance dredging activities) to create wetland or upland habitats. The MMS is not a permitting agency of onshore infrastructure. The permitting agencies would be COE and the State in which the activity has or would occur. Therefore, it would be the responsibility of COE and the States to properly mitigate and monitor onshore infrastructure impacts.

Hurricanes

The post-storm (Hurricanes Katrina and Rita) estimates of land change made by USGS (Barras, 2006) indicated that there was an increase of 217 mi^2 (562 km^2) of open-water areas following the storms, primarily comprised of wetlands being replaced by open water. These estimates were made utilizing analysis of satellite imagery (Landsat TM imagery) combined with periodic ground-truthing to monitor accuracy. These new water areas represent landlosses caused by direct removal of wetlands. They also indicate transitory changes in water area caused by remnant flooding, removal of aquatic vegetation, scouring of marsh vegetation, and water-level variation attributed to normal tidal and meteorological variation between satellite images. Permanent landlosses cannot be estimated until several growing seasons have passed and the transitory impacts of the hurricanes are minimized. **Table 4-2** summarizes the land/water changes for all coastal Louisiana hydrologic basins that were affected by the 2005 hurricanes (Barras, 2006).

Based on the analysis of the latest satellite imagery (Barras, 2007a and b), approximately 82 mi^2 (212 km^2) of new open-water areas were in areas primarily impacted by Hurricane Katrina (Mississippi River Delta basin, Breton Sound basin, Pontchartrain basin, and Pearl River basin), whereas 117mi^2 (256 km^2) were in areas primarily impacted by Hurricane Rita (Calcasieu/Sabine basin, Mermentau basin, Teche/Vermilion basin, Atchafalaya basin, and Terrebonne basin). Barataria basin contained new water areas caused by both hurricanes, resulting in some 18 mi^2 (46.6 km^2) of new water areas.

A comparison of the 2004 and 2005 imagery showed a total increase in water area of 300 mi^2 (777 km^2), but this measurement includes 83 mi^2 (214.97 km^2) of flooded lands consisting of flooded/burned marsh and flooded agricultural and developed areas occurring after the hurricanes. Adjusting for these flooded lands, the estimated increase in water area (and decrease in land) is 217 mi^2 (562 km^2). Direct correlations of land and water area changes are assumed. This coastwide 217 mi^2 (562 km^2) area of new water occurring after the hurricanes contains (1) landlosses that may be permanent, caused by direct removal of wetlands by storm surge; and (2) transitory water area increases caused by (a) remnant flooding of marsh and impounded areas, including agricultural and developed areas, (b) removal of floating and submerged aquatic vegetation, (c) scouring of marsh vegetation, and (d) water level variations caused by normal tidal and meteorological variation between images. The new land occurring after the hurricanes contains land gains caused by (1) wrack deposition, (2) rearrangement of existing marsh areas moved by storm surge, (3) aquatic vegetation that is possibly misclassified, and (4) water level variations caused by normal tidal and meteorological variation between images. These transitory gains and losses are included in calculations of net land area change. The details of these pre- and post-Hurricane Katrina comparisons are noted in **Table 4-3** (Barras, 2006).

The fresh marsh and intermediate marsh communities' land areas decreased by 122 mi^2 (316 km^2) and 90 mi^2 (233.1 km^2), respectively, and the brackish marsh and saline marsh communities' land areas decreased by 33 mi^2 (85.5 km^2) and 28 mi^2 (72.5 km^2), respectively. These new water areas represent landlosses caused by the direct removal of wetlands. They also indicate transitory changes in water area caused by remnant flooding, removal of aquatic vegetation, scouring of marsh vegetation, and water-level variation attributed to normal tidal and meteorological variation between satellite images. It was noted (Barras, 2006) that permanent losses cannot be estimated until several growing seasons have passed and the transitory impacts of the hurricanes are minimized; however, it is too early to estimate the actual overall marsh loss.

Coastal Restoration

The State of Louisiana has made a provision for wetlands protection and restoration to be part of the State's plan for hurricane protection. The Louisiana State legislature established the Coastal Protection and Restoration Authority (CPRA) and charged it with coordinating the efforts of local, State, and Federal agencies to achieve long-term and comprehensive coastal protection and restoration that integrates flood control and wetland restoration. The following four objectives were defined for the plan: reduce the risk to economic assets; restore sustainability to the coastal ecosystem; maintain a diverse array of habitats for fish and wildlife; and sustain Louisiana's unique heritage and culture. The Final Master Plan (State of Louisiana, CPRA, 2007) was submitted to the Louisiana legislature on April 30, 2007, and was approved on May 30, 2007.

Mississippi

In Mississippi the overall land cover change noted by NOAA's Coastal Change Analysis Program was much less severe than encountered in Louisiana. The total area that changed to open water is less than 5 mi^2 (3,200 ac) (Herold and McCombs, personal communication, 2007). Compared with Louisiana, this loss of emergent marsh and unconsolidated shoreline was minimal. An estimated 1,890 ac (765 ha) of coastal marshes and forests were severely damaged or destroyed (USDOC, NMFS, 2007b). The greatest change was in coastal forests, especially bottomland hardwoods. While over 70 mi^2 of forest (mostly evergreen) was lost or converted to grasses, an estimated 10 mi^2 of bottomland hardwood forests were seen changing to palustrine scrub or emergent categories. There was also a conversion of 40 mi^2 of evergreen forest to scrub/shrub cover. Estuarine marsh and wetlands suffered extensive damage from Hurricane Katrina (Mississippi Dept. of Marine Resources, 2005; Barbour, 2006).

Alabama

Along the Alabama coast there was some damage to wetlands due to erosion along the shores of some of the barrier islands. There was also some damage, although not quantified, from scoured or buried wetland habitats. The land cover changes in Alabama, observed by NOAA's Coastal Change Analysis Program, highlight the loss of forested land and the related increase to grassland area, which was likely caused by the 2005 hurricanes (Herold and McCombs, personal communication, 2007). There was a loss of approximately 50 mi^2 (12,950 ha) of hardwood forests. The areas that were primarily evergreen stands were either damaged by Hurricane Katrina or intentionally harvested and now are dominated by scrub/shrub (approximately 15 mi^2 or 3,885 ha) or grassland (approximately 17 mi^2 or 4,403 ha).

Texas

Most of the wetlands along the Texas coast are associated with the NWR's and State wildlife management areas, such as Texas Point NWR, McFaddin NWR, Sea Rim State Park, and J.D. Murphree State Wildlife Management Area. These areas comprise the McFaddin Complex and contain over 60,000 ac (24, 280 ha) of coastal marsh (fresh, intermediate, and brackish) coastal prairie (non-saline and saline), coastal woodlands, and beach/ridge habitat in Jefferson and Chambers Counties in southeast Texas (USDOC, NMFS, 2007a). The ridge/dune system that was the main buffer between the Gulf and the wetlands has been significantly lowered by the overwash of the past hurricanes. While a remnant dune/beach system still exists post-Hurricane Rita, much has been lost through erosion and shoreline retreat, leaving only a low-lying washover terrace. Loss of the existing beach dunes and the lowering of beach ridge elevations along the Gulf shoreline of the McFaddin Complex from Hurricane Rita imperils approximately 30,000 ac (12,140 ha) of nationally significant wetlands due to the increasing frequency of saltwater inundation from the Gulf of Mexico. Ongoing shoreline retreat along the Gulf of Mexico, which was exacerbated by Hurricane Rita, is resulting in a rapid loss of valuable coastal habitats, including emergent estuarine marshes and coastal prairies. In summary, the NWR's in southeast Texas suffered wetland habitat loss, primarily as a result of wave erosion, during Hurricane Rita. Impacts to three Federal refuges were estimated to include direct marsh loss of more than 75 ac (33 ha), approximately 15,000 ac (6,070 ha) of marsh under increased threat by future storms, and erosion losses along 20 mi (32 km) of shoreline.

4.1.3.2.2. Impacts of Routine Events

Background/Introduction

A detailed description of possible impacts associated with routine activities in a CPA or WPA proposed action on wetlands is presented in Chapters 4.2.2.1.3.2 and 4.2.1.1.3.2 of the Multisale EIS, respectively. Since 181 South Area is nearly 130 mi (209 km) from the nearest coast, the area has little potential for direct impact to coastal wetlands as a result of the proposed activities in that area.

The primary impacts resulting from routine activities associated with a CPA or WPA proposed action that could affect wetlands and marshes include pipeline emplacement, construction and maintenance, navigation channel use (vessel traffic), 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 and levee construction, which prevents necessary sedimentary processes.

CPA Proposed Action Analysis

The addition of the proposed routine activities associated with the inclusion of the 181 South Area in the CPA would have minimal effects on the coastal wetlands since the proposed action is located nearly 130 mi (209 km) from the nearest shore. The potential for indirect impacts may exist due to the initial needs for shore-based supply vessel support. Only a slight increase in vessel traffic is expected to occur, but vessel size may increase due to supply needs and open sea conditions. Helicopter trips are also expected to increase as a result of providing timely transportation of crews to the offshore facility. Neither of the increases in support activity would require an expansion of onshore base support and, therefore, would not directly impact coastal wetlands. Existing ports, production facilities, and navigation channels would be used, thus eliminating the need for the expansion or construction of any facilities into wetland areas.

Navigation canals have significant habitat impacts on the landscape, including significant widening. A reduction of widening in recent years was noted by Johnston et al. (2007), likely due to more aggressive management and the restoration of the canal edges to prevent erosion. Results indicate that management activities, including erosion protection and restoration along the edges of these canals, can significantly reduce canal-widening impacts on wetland loss. Impacts resulting from activities related to navigation canals can be mitigated with bank stabilization, and where possible, the beneficial use of dredged material (produced during maintenance dredging activities) to create wetland or upland habitats.

Port Fourchon is projected to be the primary base of onshore support operations in the 181 South Area and can be accessed by an armored channel. Since the vessel support of a CPA proposed action will be utilizing primarily armored coastal channels, as well as existing offshore channels and sea lanes, vessel-related erosion should be minimal and the need for channel maintenance should not significantly increase as a result of the proposed activity.

It is possible that up to one gas production facility may be required as a result of a CPA proposed action. If needed, the facility would be permitted in accordance with applicable State and Federal laws governing the use and protection of wetlands, as noted in the Clean Water Act, NEPA, and the applicable guidelines and regulations noted in the State Coastal Zone Management Program. If facility construction is in a wetland area, the construction will be done in such a way as to minimize and avoid impacts to wetlands. Unavoidable damages will be mitigated through the various Federal and State mitigation requirements in accordance with NEPA guidelines and the Clean Water Act regulations governing these actions. An expansion of an existing facility in a previously developed area is more likely than developing a completely new facility, which would further reduce potential impacts to wetlands.

Zero to one pipeline landfall is projected as a result of a CPA proposed action. The construction of new pipelines and pipeline canals are much narrower than in the past because of advances in technology and improved methods of installation due to a greater awareness among regulatory agencies and industry. Johnston et al. (2007) found that the magnitude of impacts from OCS-related pipelines described is inversely proportional to the quantity and quality of mitigation techniques applied. Pipelines with extensive mitigation measures appeared to have minimal impacts, while pipelines not backfilled and/or that had spoil banks remaining after construction attributed to significant habit changes. Through proper construction methods, mitigation, and maintenance, impacts can be minimized or altogether avoided. The MMS is not a permitting agency of onshore pipelines. The permitting agencies would be COE and the State in which the activity has or would occur. Therefore, it would be the responsibility of COE and the States to properly mitigate and monitor onshore pipeline impacts.

If dredging is required as a result of channel maintenance or pipeline installation, the dredged material will be used for wetland creation or other beneficial use and will not be placed in wetlands in a manner that would fill or alter the hydrology of the area so that its wetland function would be lost.

There are currently disposal sites designated for OCS-related waste products as well as oil and gas support facilities that are capable of supporting existing and proposed activity, including activity that would result from the addition of the 181 South Area (Dismukes et al., 2007). Up to one new pipeline landfall and up to one new gas processing plant are projected as a result of a CPA proposed action. No further expansion of existing onshore facilities should involve wetland development.

Indirect impacts may occur as a result of increased maintenance dredging, channel improvements, and erosion control as a result of the slight increases in vessel traffic and size required to support the 181 South Area. These impacts would be mitigated to minimal impacts since the State Coastal Zone Management Program guidance requires beneficial use of dredged material either for wetland creation or beach restoration. The addition of the 181 South Area is expected to result in a relatively minor amount of additional vessel trips.

WPA Proposed Action Analysis

For a proposed action in the WPA, 0-1 pipeline landfalls are projected. Up to 2 km (1.2 mi) of onshore pipeline are projected to be constructed in coastal Texas in support of a WPA proposed action. Through proper construction methods, mitigation, and maintenance, impacts can be minimized or altogether avoided. The MMS is not a permitting agency of onshore pipelines. The permitting agencies would be COE and the State in which the activity has or would occur. Therefore, it would be the responsibility of COE and the States to properly mitigate and monitor onshore pipeline impacts.

The Multisale EIS presented estimates of wake erosion due to vessel traffic as a result of a proposed action. However, these estimates do not consider that OCS operations primarily stage from armored channels like Port Fourchon; therefore, impacts from vessel traffic related to a WPA proposed action should remain minimal. For non-armored channels, wetland loss resulting from canal widening can be significantly reduced through management activities, including erosion protection and restoration along the edges of these canals. Impacts resulting from activities related to navigation canals can be mitigated with bank stabilization, and where possible, the beneficial use of dredged material (produced during maintenance dredging activities) to create wetland or upland habitats.

There are no new navigation channels or pipeline canals planned for construction as a result of WPA activity; however, a WPA proposed action may contribute to maintenance of existing navigation channels. Dredged material disposal associated with these activities would be used either beneficially for wetland restoration, beach nourishment, or the construction or repair of erosion control features (e.g., jetties, finger dikes, groins etc).

Because of wetland protection regulations, no new dredged material disposal sites will be developed in wetlands. Some seepage from disposal sites into adjacent wetland areas may occur and result in damage to wetland vegetation. State requirements are expected to be enforced to prevent and correct such occurrences.

The one gas processing plant that may be constructed as a result of a WPA proposed action is not likely to be developed in a sensitive wetland area due to the current Federal and State permit process and wetland regulations. It is a more likely scenario that an expansion of an existing facility in a previously disturbed or developed area would be preferable to developing a new site and facility. If it is necessary to develop a wetland site, the area must be developed and mitigated in accordance with both the State and Federal regulations that are consistent with and comply with NEPA, the Clean Water Act, and State Coastal Zone Management Programs. Under these regulatory programs, the State, along with COE, are responsible for mitigation of the unavoidable impacts to wetlands.

Summary and Conclusion

In summary, the effects to coastal wetlands from the primary impact-producing factors associated with a CPA or WPA proposed action are expected to be low. The loss of 0-8 ha (0-20 ac) of wetlands habitat is estimated as a result of 0-2 km (0-1.2 mi) of new pipelines projected as a result of a proposed action. Maintenance dredging of navigation channels and canals is expected to occur with minimal impacts; a 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 coastal wetlands. Vessel traffic associated with a proposed action is expected to contribute minimally to the erosion and widening of navigation channels and canals. Overall, impacts from pipeline emplacement is expected to be low and could be further reduced through mitigation, such as horizontal, directional (trenchless) drilling techniques to avoid damages to these sensitive habitats. Secondary impacts to wetlands would be primarily from vessel traffic corridors and should remain minimal, considering OCS operations primarily stage service bases with armored channels like Port Fourchon.

4.1.3.2.3. Impacts of Accidental Events

Background/Introduction

A detailed description of the accidental impacts on wetlands can be found in Chapter 4.4.3.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

The primary, accidental impact-producing factors with the potential to impact the coastal wetlands are generally oil spills and most specifically and significantly the coastal and inland spills adjacent to the coastal wetlands. Chapter 4.3 of the Multisale FEIS has a complete discussion of oil spills and the various impacting factors and risk analysis, while Chapter 4.4.3.2 of the Multisale EIS specifically addresses the types and severity of wetland impacts. While there are concerns that offshore spills may contribute to wetland damage because of the distance offshore of these Federal facilities, the possibility of spills reaching coastal wetlands with the toxicity to significantly impact the coastal wetlands is low. The toxicity of the spilled oils is greatly reduced or eliminated by weathering, wave action, and the use of dispersants if used to contain the spill in the offshore environment.

Although the probability of occurrence is low, the greatest threat to wetland habitat is from an inland spill resulting from a vessel accident or pipeline rupture. Coastal or inland spills are of greatest concern since these spills would be in much closer proximity to the wetland resource. While a resulting slick may cause minor impacts to wetland habitat, the equipment and personnel used to clean up a slick over the impacted area may 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. The fate and behavior of oil spills, availability and adequacy of oil-spill containment and cleanup technologies, oil-spill cleanup strategies, impacts of various oil-spill cleanup methods, effects of weathering on oil spills, toxicological effects of fresh and weathered oil, air pollution associated with spilled oil, and short-term and long-term impacts of oil on wetlands are additional accidental concerns. Numerous investigators have studied the immediate impacts of oil spills on wetland habitats in the Gulf area. Often, seemingly contradictory conclusions are generated from these impact assessments, which can be explained by differences in oil concentrations contacting vegetation, the chemical composition of the oil spilled, vegetation type and density, season of year, preexisting stress level on the vegetation, soil types, water levels, weather, and numerous other factors. In overview, the data suggest that vegetation that is lightly oiled will experience plant die-back, followed by recovery without replanting. Therefore, most impacts to vegetation are considered to be short term and reversible (Webb et al., 1985; Alexander and Webb, 1987; Lytle, 1975; Delaune et al., 1979; Fischel et al., 1989).

The already eroded Louisiana barrier island chain was significantly damaged by Hurricanes Katrina and Rita, thus further lowering the protection afforded the mainland marshes and beaches from oil spills that these barrier features previously provided. Breton NWR, one of the islands comprising the hard-hit Chandeleur barrier island chain, lost approximately 50 percent of its landmass (Hall, Congressional testimony, 2006). In addition, the coastal barrier islands along the Mississippi/Alabama coast were severely degraded by Hurricanes Katrina and Ivan. Approximately 200 ac (81 ha) on Petit Bois, Horn, Ship, and Cat Islands were destroyed, leaving the remaining acreage with a drastically reduced functionality (Barbour, 2006). With the reduced protection of the barrier islands, there is a greater potential for the oiling of coastal wetlands.

CPA Proposed Action Analysis

Wetlands in the CPA follow the Louisiana, Mississippi, and Alabama coastlines. The degraded barrier islands off the Louisiana and Mississippi coasts still afford some reduced degree of protection from offshore spills after being degraded by Hurricanes Katrina and Rita. The greatest threat to coastal wetlands would be from inland spills. Based on the assumption that spill occurrence is proportional to the volume of oil handled, sensitive coastal environments in eastern Louisiana, from Atchafalaya Bay to east of the Mississippi River, including Barataria Bay, have the greatest risk of being contacted by spills from operations related to a CPA proposed action. Spills that could occur in coastal waters from a proposed action support operations are estimated at 46-102 spills for a CPA proposed action over its 40-year life. Offshore oil spills are much less likely to contact coastal wetlands than are inshore spills because of the potential for spills resulting from inland pipelines and vessel accidents are in close proximity to the wetland resources. The probabilities of an offshore spill ≥1,000 bbl occurring and contacting environmental features are described in Chapter 4.3.1.8 of the Multisale EIS. Eight parishes in Louisiana and two counties in Texas have a chance of spill contact that is >0.5 percent. For these parishes and counties, the chance of an OCS offshore spill ≥1,000 bbl ranges from 1 to 16 percent. In Louisiana, the Deltaic Plain area has the highest risk from a CPA proposed action (Chapter 4.3.1 of the Multisale EIS). As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. Activity that would result from the addition of the 181 South Area would cause a negligible increase in the risk of a large spill occurring and contacting wetland habitats. Overall, impacts to wetland habitats from an oil spill associated with activities related to a CPA proposed action would be expected to be low and temporary.

WPA Proposed Action Analysis

Wetlands in the WPA are concentrated landward of the barrier beaches of Texas. Estuarine marshes largely occur as continuous and discontinuous bands around bays, lagoons, and river deltas. Broad expanses of emergent wetland vegetation do not commonly occur south of Baffin Bay because of the arid climate and hypersaline waters. In the vicinity of southern Padre Island, marshes are minimal and unstable, compared with the more northern Gulf. In Tamaulipas, marshes behind the barrier islands are even less abundant than seen in the vicinity of Padre Island. Detailed descriptions of these marshes and the impacts of oil on them can be found in Chapters 3.2.1.2.and 4.4.3.2 of the Multisale EIS, respectively. The McFaddin Complex comprises approximately 60,000 ac (24,280 ha) of coastal marsh (i.e., fresh, intermediate, and brackish), coastal prairie (non-saline and saline), coastal woodlands, and beach/ridge habitats in Jefferson and Chambers Counties in southeast Texas (USDOC, NMFS, 2007a) The NWR's in southeast Texas suffered wetland habitat loss, primarily as a result of wave erosion, during Hurricane Rita. Impacts to three Federal refuges were estimated to include marsh loss of more than 75 ac, (30 ha) approximately 15,000 ac (6,070 ha) of marsh under increased threat by future storms, and erosion losses along 20 mi (32 km) of shoreline (USDOC, NMFS, 2007a). Due to the degraded shorelines and the reduction in elevation and vegetation on the Texas barrier islands that previously afforded some protection to these coastal fringe marshes, the vulnerability of these wetlands to oil spills has increased.

These wetlands are generally more susceptible to contact by inshore spills, which have a low probability of occurrence. Inshore vessel collisions may release fuel and lubricant oils, and pipeline ruptures may release crude and condensate oil. Although the impact may occur generally over coastal regions, the impact has the highest probability of occurring in Galveston and Matagorda Counties in Texas in the vicinities where WPA oil is handled. Spills that could occur in coastal waters from proposed action support operations are estimated at 15-34 spills for a WPA proposed action over its 40-year life. Offshore oil spills are much less likely to contact these wetlands than are inshore spills because these areas are generally protected by barrier islands (although reduced due to storm damage), peninsulas, sand spits, and currents. The probabilities of an offshore spill ≥1,000 bbl occurring and contacting environmental features are described in Chapter 4.3.1.8 of the Multisale EIS. Six counties in Texas have a chance of spill contact that is >0.5 percent. For these counties, the chance of an OCS offshore spill ≥1,000 bbl occurring and reaching the shoreline ranges from 1 to 5 percent as the result of a proposed action over its 40-year life. Weathering, wave action, and the use of offshore dispersants would reduce the amount of oil that would reach wetland areas and would result in minimal impacts.

Summary and Conclusion

Because of the location of the coastal wetlands in relation to a CPA or WPA proposed action, inshore spills pose the greatest threat. Such spills may result from either vessel collisions that release fuel and lubricants or from pipelines that rupture. Nearshore spills are much smaller in volume and weather quickly. Should they occur, these impacts would be considered short term in duration and minor in scope. If the spill makes landfall and a cleanup proceeds with approved procedures, impacts to wetlands would be minimal due to the weathered condition of the oil and the containment and cleanup techniques. While a resulting slick may cause minor impacts to wetland habitat, the equipment and personnel used to clean up a slick over the impacted area may 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

The MMS has reexamined the analysis for wetland resources presented in the Multisale EIS, based on the additional information presented above. This new information supports the previous assessments contained in the Multisale EIS, which is incorporated by reference. No significant new information was found that would alter the overall conclusion that impacts on the wetland resources from accidental impacts associated with a CPA or WPA proposed action would be minimal.

4.1.3.2.4. Cumulative Impacts

Background/Introduction

A detailed description of cumulative impacts upon wetlands can be found in Chapter 4.5.3.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Impacts from residential, commercial, and agricultural and silvicultural (forest expansion) developments are expected to continue in coastal regions around the Gulf. Existing regulations and development permitting procedures indicate that development-related wetland loss may be slowed and that very few (0-1 including the 181 South Area) new onshore OCS facilities, other than pipelines (0-1 landfall including the 181 South Area), will be constructed in wetlands. 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. Locally, subsidence may be due to the extraction of large volumes of oil and gas from subsurface reservoirs, although subsidence associated with this factor seems to have slowed greatly over the last three decades as the reservoirs are depleted. Indirect impacts from dredging new canals for State onshore oil and gas development (Chapter 4.1.3.3.3 of Multisale EIS) and from the maintenance of the existing canal network is expected to continue. Maintenance dredging of the OCS-related navigation channels accounts for 10 percent of the dredged material produced. Insignificant adverse impacts upon wetlands from maintenance dredging are expected because the large majority of the material would be disposed upon existing disposal areas. Alternative dredged material disposal methods can be used to enhance and create coastal wetlands. Depending upon the regions and the soils through which they were dredged, secondary adverse impacts of canals may be more locally significant than direct impacts. Additional wetland losses may be generated by the secondary impacts of saltwater intrusion, flank subsidence, freshwater-reservoir reduction, and deeper tidal penetration. A variety of mitigation efforts have been initiated to protect against direct and indirect wetland loss. The nonmaintenance of mitigation structures that reduce canal construction impacts can have substantial impacts upon wetlands. These localized impacts are expected to continue. Various estimates of the total, relative direct and indirect impacts of pipeline and navigation canals on wetland loss vary enormously; they range from a low of 9 percent (Britsch and Dunbar 1993) to 33 percent (Penland et al., 2001a and b) to estimates of greater than 50 percent (Turner et al., 1982; Bass and Turner, 1997; Scaife et al., 1983). A panel review of scientific evidence suggests that wetland losses directly attributable to all human activities account for less than 12 percent of the total wetland loss experienced since 1930 and approximately 29 percent of the total losses between 1955 and 1978 (Boesch et al., 1994). Of these direct losses, 33 percent are attributed to canal and spoil bank creation (10% of overall wetland loss). In Louisiana, deepening Fourchon Channel to accommodate larger, OCS-related service vessels has occurred within a saline marsh environment and will afford the opportunity for the creation of wetlands with the dredged materials. Also, deepening the Corpus Christi and Houston Ship Channels is non-OCS related and should also afford the opportunity to create wetlands with dredged material.

Dredging

Maintenance dredging of navigation channels and canals is expected to occur with minimal impacts; a CPA or WPA 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 coastal wetlands. A CPA or WPA proposed action is expected to use existing navigation channels and contribute minimally to the need for additional channel maintenance. 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 disposed upon existing disposal areas. Alternative dredged material disposal methods can be used to enhance and create coastal wetlands. Depending upon the regions and soils through which they were dredged, secondary adverse impacts of canals may be more locally significant than direct impacts. The OCS activities are expected to result in some level of dredging activity associated with the expansion of offshore platforms or onshore transfer or production facilities if needed. The primary indirect impacts from dredging would be wetland loss as a result of saltwater intrusion or vessel traffic erosion. However, the primary support, transfer, and production facilities used for a CPA or WPA proposed action are located along armored canals and waterways, thus minimizing marsh loss.

Navigation Channels and Canals

The effects of pipelines, canal dredging, navigation activities on wetlands are described in Chapters 4.2.1.1.3.2 and 4.2.2.1.3.2 of the Multisale EIS. Subsidence of wetlands is discussed in more detail in Chapter 4.1.3.3.1 of the Multisale EIS.

As noted in the referenced chapters above, the previous OCS activities associated with the CPA and WPA are expected to require some level of dredging, channel deepening, and maintenance of access canals. Onshore activity that would further accelerate wetland loss would include additional access channels, drill slips, and preparation required to construct new well sites and expand or construct onshore and offshore facilities (production platforms or receiving and transfer facilities). Management activities, including erosion protection and restoration along the edges of these canals, can significantly reduce canal-widening impacts on wetland loss (Johnston et al., 2007). Impacts resulting from activities related to navigation canals can be mitigated with bank stabilization, and where possible, the beneficial use of dredged material (produced during maintenance dredging activities) to create wetland or upland habitats.

Pipelines

Modern pipeline installation methods and impacts are described in Chapters 4.1.1.8.1 and 4.1.2.1.7 of the Multisale EIS. While impacts are greatly reduced by mitigation techniques, remaining impacts may include expansion of tidal influence, saltwater intrusion, hydrodynamic alterations, erosion, sediment transport, and habitat conversion (Cox et al., 1997; Morton, 2003; Ko and Day, 2004). The majority (over 80%) of OCS-related direct landloss is estimated to be from OCS pipelines (Turner and Cahoon, 1988). Since the beginning of OCS activities in the Gulf of Mexico, approximately 15,400 km (9,563 mi) of OCS pipelines have been constructed in Louisiana seaward of the inland CZM boundary to the 3-mi State/Federal boundary offshore. Of those pipelines, about 8,000 km (4,971 mi) cross wetland and upland habitat. The remaining 7,400 km (4,595 mi) cross waterbodies (Johnston et al., 2007). The total length of non-OCS pipelines through wetlands is believed to be approximately twice that of the Gulf OCS Program, or about 15,285 km (9,492 mi) for a total of approximately 23,285 km (14,460 mi) of pipelines through Louisiana coastal wetlands. The majority of OCS pipelines entering State waters ties into existing pipeline systems and do not result in new landfalls. Pipeline maintenance activities that disturb wetlands are very infrequent and are mitigated to the maximum extent practicable.

The widening of OCS pipeline canals does not appear to be an important factor contributing to OCS-related direct landloss. This is because few pipelines are open to navigation, and the impact width does not appear to be significantly different than that for open pipelines closed to navigation. As a result of the OCS Program (2007-2046), up to 64-94 km (40-58 mi) of onshore pipeline are projected to be constructed in the CPA and WPA. The predicted landloss (based on an average of 4 ha (9 ac) of conversion to open water per linear kilometer of pipeline (300-m or 984-ft buffer zone) from the estimated 64-94 km (40-58 mi) of new OCS pipeline construction ranges from approximately 256-376 ha (633-929 ac) total over the 40-year analysis period. Based on the projected coastal Louisiana wetlands loss of 132,607 ha (327,679 ac) for the years 2000-2040 (Barras et al., 2003), this represents about 0.2 percent of the total expected wetlands loss for that time period. This estimate does not take into account the present regulatory programs and modern installation techniques. Recently built pipelines and pipeline canals are much narrower than in the past because of advances in technology and improved methods of installation due to a greater awareness among regulatory agencies and industry (Johnston et al., 2007). The magnitude of impacts from OCS-related pipelines is inversely proportional to the quantity and quality of mitigation techniques applied. Pipelines with extensive mitigation measures appeared to have minimal impacts, while pipelines not backfilled and/or that had spoil banks remaining after construction attributed to significant habit changes. Through proper construction methods, mitigation, and maintenance, impacts can be minimized or altogether avoided. The MMS is not a permitting agency of onshore pipelines. The permitting agencies would be COE and the State in which the activity has or would occur. Therefore, it would be the responsibility of COE and the States to ensure that wetland impacts resulting from pipeline construction are properly mitigated and monitored

Oil Spills

The potential for oil spills will continue with coastal spills in the inland or coastal waters creating the greatest concern for coastal wetlands due to their proximity to these vegetated areas. Offshore spills are less likely to reach the coastal wetlands in a fully toxic condition due to weathering and the interception of spills by barrier islands. However, due to the reduced elevation and erosion of these barriers by Hurricanes Katrina and Rita, the level of protection afforded the mainland has been greatly reduced but not quantified (USDOC, NMFS, 2007a). Flood tides may now bring some oil through tidal inlets into areas landward of barrier beaches. The turbulence of tidal water passing through most tidal passes would break up the slick, thereby accelerating dispersion and weathering. For the majority of these situations, light oiling of vegetated wetlands may occur, contributing less than 0.1 L/m^2 on wetland surfaces. Any adverse impacts that may occur to wetland plants are expected to be very short lived, probably less than 1 year. Coastal OCS spills could occur as a result of pipeline accidents and barge or shuttle tanker accidents during transit or offloading. The frequency, size, and distribution of all coastal spills are provided in Chapter 4.1.3.4.of the Multisale EIS. Impacts of OCS coastal spills are also discussed in Chapter 4.3.1.6 of the Multisale EIS). Non-OCS spills can occur in coastal regions as a result of import tankers, coastal oil production activities, and petroleum product transfer accidents. Their distribution is believed to be similar to that described in Chapter 4.3.1 of the Multisale EIS. Numerous wetland areas have declined or have been destroyed as a result of oil spills caused by pipeline breaks or tanker accidents. The oil stresses the wetland communities, making them more susceptible to saltwater intrusion, drought, disease, and other stressors (Ko and Day, 2004). Spills that occur in or near Chandeleur or Mississippi Sounds could potentially impact wetland habitat in or near the Gulf Islands National Seashore and the Breton National Wildlife Refuge and Wilderness Area. Because of their natural history, these areas are considered areas of special importance, and they support endangered and threatened species. Although the wetland acreage on these islands is small, the wetlands make up an important element in the habitat of the islands. This area was severely impacted by Hurricane Katrina in August 2005. Because the inlets that connect Mississippi Sound with the marsh-fringed estuaries and lagoons within the islands are narrow, a small percentage of the oil that contacts the Sound side of the islands will be carried by the tides into interior lagoons. The past discharge of saltwater and drilling fluids associated with oil and gas development has been responsible for the decline or death of some marshes (Morton, 2003). Discharging OCS-related produced water into inshore waters has been discontinued and all OCS-produced waters transported to shore will either be injected or disposed of in Gulf waters and will not affect coastal wetlands (Chapter 4.1.1.4.2 of the Multisale EIS).

The numbers and sizes of coastal spills are presented in Table 4-13 of the Multisale EIS. About 95 percent of these spills are projected to be from non-OCS-related activity. Of coastal spills <1,000 bbl, the assumed size is 5 bbl; therefore, the great majority of coastal spills would affect a very small area and dissipate rapidly. The small coastal spills that do occur from OCS-related activity would originate near terminal locations in the coastal zones of Texas, Louisiana, Mississippi, and Alabama but primarily within the Houston/Galveston area of Texas and the deltaic area of Louisiana. A total of 4-5 large (≥1,000 bbl) offshore spills are projected to occur annually from all sources Gulfwide. Of these offshore spills, one is estimated to occur every 1 to 2 years from the Gulfwide OCS Program (Table 4-15 of the Multisale EIS). A total of 1,550 to 2,150 smaller offshore spills (<1,000 bbl) are projected annually Gulfwide. The majority of these spills (1,350-1,900) would originate from OCS Program sources.

Chapter 4.3.1 2 in the Multisale EIS describes projections of future spill events in more detail. The OCS-related spills in the cumulative area are expected to cause a 1 percent or less decrease in fish resources. The impact of non-OCS-related spills in this area is expected to cause a 10 percent or less decrease in fish resources. Due the proximity of the 181 South Area and the current oil cleanup techniques, the chance of an oil spill making contact with coastal or barrier island wetlands is minimal.

Development of Wetlands

The development of wetlands for agricultural, residential, and commercial uses will continue but with more regulatory and planning constraints. Wetland damage will be minimized through the implementation of Coastal Zone Management Guidelines, along with COE regulatory guidelines for wetland development combined with various State and Federal coastal development programs such as CIAP, and Louisiana's CWPPRA and Louisiana Coastal Protection and Restoration Project (LACPR) programs.

The past discharge of saltwater and drilling fluids associated with oil and gas development has been responsible for the decline or death of some marshes (Morton, 2003). Discharging OCS-related produced water into inshore waters has been discontinued and all OCS-produced waters transported to shore will either be injected or disposed of in Gulf waters and will not affect coastal wetlands (Chapter 4.1.1.4.2 of Multisale EIS). Dredged material will be deposited either in existing approved discharge sites or will be used beneficially for wetland restoration or creation. In the Port Fourchon area, some of the existing areas being filled with dredged material may be used, if needed, for the expansion of oil production or support facilities.

Cumulative loss of wetlands has occurred as a result of both natural subsidence through compaction of Holocene strata (the rocks and deposits from 10,000 years ago to present), as well as human factors such as onshore oil and gas extraction, groundwater extraction, drainage of wetland soils, and burdens placed by buildings roads and levees. Areas of local subsidence have also been correlated to the past extraction of large volumes of underground resources including oil, gas, water, sulfur, and salt (Morton, 2003; Morton et al., 2002 and 2005). There is increasing new evidence of the importance of the effect of sea-level rise (or marsh subsidence) as it relates to the loss of marsh or changes in marsh types and plant diversity (Spalding and Hester, 2007). This study shows that the very structure of coastal wetlands will likely be altered by sea-level rise, as community shifts will be governed by the responses of individual species to new environmental conditions. Flood control and channel training along the Mississippi River will continue to deprive the delta of the needed sediment required for the creation or maintenance of the existing wetlands.

Another recent development that is presently being proposed along the Mississippi Gulf Coast, but planned for the Louisiana and Texas coast, is the preparation of salt domes for storage of strategic oil reserves. The current plan would result in discharging highly concentrated salt solutions into the nearshore Gulf and bays. The potential for large modifications (increases) in coastal salinities could result in devastating or severely compromising the coastal marshes (*Mississippi Press*, 2007).

Summary and Conclusion

Wetlands are most vulnerable to inshore or nearshore oil spills but are also at risk for offshore spills with risks minimized by distance, time, sea conditions, and weather. Spill sources include vessel collisions, pipeline breaks, and shore-based transfer and refining facilities and production facilities. The wetlands associated with a CPA or WPA 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 reduced post-Hurricane Katrina), and product transportation through existing pipelines or pipeline corridors. Offshore spills related to a CPA or WPA proposed action are not expected to reach wetlands in toxic conditions due to distance and weathering. If they do reach shore, only light localized impacts to inland wetlands would occur. If any spills occur, they will likely be small and at service bases or other support facilities, and they would not be expected to affect wetlands.

While landloss will continue from saltwater intrusion, the State of Louisiana, along with COE, has implemented freshwater diversion projects to minimize the effect of this saltwater-induced landloss. Landloss will continue from vessel traffic; however, based on the minimal increase in traffic caused by a proposed action, loss would be minimal. A CPA or WPA proposed action will not require any 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 will be 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 oil and gas industry projects, which have resulted in the dredging of huge numbers of access channels. In Mississippi, Alabama, and Florida, agricultural, residential, and commercial developments have caused the most destruction of wetlands. In Florida, recreational and tourist developments have been particularly destructive. These trends are expected to continue. During the period of 2001-2040, between 248,830 and 346,590 ha (614,872 and 856,443 ac) of wetlands will be lost from the Louisiana coastal zone and 1,600-2,000 ha (647-809 ac) will 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 will continue eroding, largely at the expense of wetlands; however, channel armor may be added at a later date. 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. The modern construction techniques and mitigative measures result in zero (0) to negligible impacts on wetland habitats. The current MMS/USGS pipeline study (Johnston et al., 2007) is continuing to develop models that will aid in quantifying habitat loss associated with OCS activities. A CPA and WPA proposed action represents about 1 and 3-4 percent, respectively, of the OCS impacts that will occur over the 40-year analysis period. Impacts associated with the 181 South Area are a minimal part of the overall OCS impacts that will occur during the lease period. 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 Texas, Mississippi, Alabama, and Florida, but at slower rates. The incremental contribution of any single proposed action to the cumulative impacts on coastal wetlands is expected to be very small.

4.1.3.3. Seagrass Communities

The MMS has reexamined the analysis for seagrass communities presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for seagrass communities presented in the Multisale EIS. The 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity; therefore, no significant additional impacts on seagrass communities are projected as a result of the inclusion of the 181 South Area.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Turbidity impacts from pipeline installation and maintenance dredging associated with a CPA or WPA proposed action would be temporary and localized. The increment of impacts from service vessel transit associated with a CPA or WPA proposed action would be minimal. Should an oil spill occur near a seagrass community, impacts from the spill and cleanup would be considered short term in duration and minor in scope. Close monitoring and restrictions on the use of bottom-disturbing equipment to clean up the spill would be needed to avoid or minimize those impacts. Of cumulative activities, dredging generates the greatest overall risk to submerged vegetation, while hurricanes cause direct damage to seagrass beds, which may fail to recover in the presence of cumulative stresses. A CPA or WPA proposed action would cause a minor incremental contribution to cumulative impacts due to dredging from maintenance of channels.

4.1.3.3.1. Description of the Affected Environment

A detailed description of seagrass communities can be found in Chapter 3.2.1.3 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Three million hectares (7,400,000 ac) of submerged seagrass beds are estimated to exist in exposed, shallow coastal waters of the northern Gulf of Mexico. An additional 166,000 ha (410,000 ac) are found in protected, natural embayments and are not considered exposed to OCS impacts. The area off Florida contains approximately 98.5 percent of all coastal seagrasses in the northern Gulf of Mexico; Texas and Louisiana contain approximately 0.5 percent. Mississippi and Alabama have the remaining 1 percent of seagrass beds. No seagrasses occur offshore in the CPA and WPA; the 181 South Area has no seagrasses because of its great depth and distance from shore. Primarily because of low salinity and high turbidity, robust seagrass beds along the Gulf of Mexico are found only within a few scattered, protected locations. These inshore seagrasses serve as important nursery and feeding habitat for many species of fish and birds. Seagrasses in the WPA are widely scattered beds in shallow, high-salinity coastal lagoons and bays. The most extensive seagrass beds in Texas are located behind barrier islands in south Texas. Lower-salinity submerged aquatic vegetation grows in the upper portions of some estuaries and in coastal lakes and rivers.

In the CPA, the turbid waters and soft, highly organic sediments of Louisiana’s estuaries and offshore areas limit distribution of higher salinity seagrass beds. Consequently, only a few areas in coastal Louisiana, mostly in Chandeleur Sound, support seagrass beds. These beds have been repeatedly damaged by the natural processes of transgression from hurricane overwash of the barrier islands. Over time, seagrass recolonizes the new sand flats on the shoreward side, and the natural processes of sand movement rebuild the islands. However, the frequency of recent storms has led to a substantial reduction and change of seagrass habitat in the CPA. See Chapter 3.2.1.3 of the Multisale EIS for more information about hurricane impacts to seagrasses.

A search was conducted for new information published since completion of the Multisale EIS. Various Internet sources were examined to determine any recent information regarding seagrass. Sources investigated include the USGS National Wetlands Research Center, the USGS Gulf of Mexico Integrated Science Data Information Management System, Gulf of Mexico Alliance workshops in the spring of 2007, Florida Department of Environmental Protection, USEPA, and coastal universities. Other sites were found through general Internet searches.

New information was discovered from these information sources. The workshops held by the Gulf of Mexico Alliance in the spring of 2007 revealed some new research and new collations of old information (May, 2007; Vittor, 2007; Hardegree, 2007). May (2007) discussed the distribution of seagrass in southeastern Mississippi waters, finding some burial of seagrass after Hurricane Katrina, seasonal fluctuation of *Ruppia maritima*, and persistent *Halodule wrightii*. Vittor (2007) discussed seagrass in Mississippi Sound and Alabama based on four aerial surveys from 1940 to 2002. His analysis showed seagrass declines of from 52 to 88 percent in these areas since 1940. Hardegree (2007) highlighted declines in seagrass in Christmas Bay and the Lower Laguna Madre. He also analyzed propeller scarring, recovery, and regulation. In 2006, a master’s thesis on seagrass communities in Biloxi Marsh, Mississippi reported fish communities at sites denuded of seagrass by Hurricane Katrina resembled those of sites with no seagrass before the hurricane (Maiaro, 2007). This new information on seagrass supports and reinforces the description of the environment presented in the Multisale EIS.

The distribution of seagrass beds in coastal waters of the Gulf of Mexico have diminished during recent decades. Primary factors believed to be responsible include dredging, dredged material disposal, coastal development including shore armoring, trawling, water quality degradation, hurricanes, a combination of flood protection levees that have directed freshwater and sediments away from wetlands, saltwater intrusion that moved growing conditions closer inland, and infrequent freshwater diversions from the Mississippi River into coastal areas during flood stage.

4.1.3.3.2. Impacts of Routine Events

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA or WPA proposed action on seagrass communities is presented in Chapters 4.2.2.1.3.3 and 4.2.1.1.3.3 of the Multisale EIS, respectively. The routine activities associated with a proposed action that would impact seagrass communities include construction of pipelines, vessel traffic, and dredging.

Jetting of trenches for pipeline burial in water shallower than 200 ft (60 m) displaces sediments. The denser sediments fall out of suspension quickly; the finer sediments that decrease water clarity remain in suspension longer. Although the majority of materials resuspended by jetting return to the water bottom within a few feet or meters of the trench, lighter materials can be carried for several kilometers. The COE and State agencies review pipeline permits and require mitigation of turbidity by using screens and other confinement methods, turbidity monitoring, surveys for locating seagrass beds, and immediate action taken to correct turbidity problems. Adverse effect on seagrass would be temporary and localized.

Seagrass would be impacted by navigation traffic due to wake erosion and prop wash. Most OCS support vessels have displacement hulls and create little wake. However, sediment is suspended in the water column by prop wash in shallow channels. Vessels that vary their inland route from established navigation channels can directly scar beds of submerged vegetation.

Dredging temporarily increases turbidity levels and reduces light penetration through the water column in the vicinity of the dredging and disposal of materials. Reduced light has been linked to reductions of both seagrass cover and productivity (Orth and Moore, 1983; Kenworthy and Haunert, 1991; Dunton, 1994; Czerny and Dunton, 1995). Dredging has been determined to be one of the major causes of light reduction that results in changes in seagrass cover, composition, and biomass. Changes in species composition are mostly the result of natural processes (i.e., succession) but have been prompted by moderation of salinity resulting from dredging.

CPA Proposed Action Analysis

The routine activities associated with a CPA proposed action that would impact seagrass communities include installation of pipelines in coastal waters, vessel traffic, and maintenance dredging of navigation canals. The 181 South Area would contribute incrementally to the amount of vessel traffic and required maintenance dredging.

Up to one new pipeline is projected to be installed in State waters as a result of a CPA proposed action. A new installation would temporarily increase the local total suspended solids in the water. The COE and State permits would require turbidity mitigation, monitoring, surveys to locate grassbeds, and immediate correction of problems. Approved pipeline routes would avoid seagrass communities. The effects would be temporary and localized.

Service-vessel round trips projected for a CPA proposed action are 119,000-241,000 trips over the life of a proposed action. Based on current service-base usage, it is assumed the majority of these trips would transit Louisiana’s coastal waters. The number of service-vessel trips projected annually for a CPA proposed action would represent less than 1 percent of the total annual traffic on these OCS-related waterways. Seagrasses in Louisiana are rare to nonexistent in areas around Port Fourchon and other high traffic areas that may be frequented by service vessels. Vessel traffic would have little to no impact on seagrass communities. See Chapter 4.1.1.8.4 of the Multisale EIS for information about vessel traffic.

Dredging resuspends sediments and increases turbidity in nearby coastal waters. A CPA proposed action would contribute to maintenance dredging of existing navigation canals. The increment would be less than 1 percent, equal to the increment in vessel traffic for the navigation canals. Maintenance dredging would temporarily increase turbidity levels in the vicinity of dredging and disposal of materials. No new navigation channels are expected to be dredged as a result of a CPA proposed action. Due to the long distance from shore (130 mi or 209 km), the 181 South Area would be serviced primarily by large vessels with a deep draft. This would add disproportionately to use of deep navigation channels. See Chapters 4.1.2.1.9, 4.1.3.3.3, and 4.2.2.1.3.3 of the Multisale EIS for information about dredging and navigation channels.

WPA Proposed Action Analysis

The routine activities associated with a WPA proposed action that would impact seagrass communities include installation of pipelines in coastal waters, vessel traffic, and maintenance dredging of navigation canals.

Up to one new pipeline is projected to be installed in State waters as a result of a WPA proposed action. A new installation would temporarily increase the local total suspended solids in the water. The COE and State permits would require turbidity mitigation, monitoring, surveys to locate grassbeds, and immediate correction of problems. Approved pipeline routes would avoid seagrass communities. The effects would be temporary and localized.

Service-vessel round trips projected for a WPA proposed action are 94,000-155,000 trips over the life of a proposed action. The number of service-vessel trips projected annually for a WPA proposed action would represent less than 1 percent of the total annual traffic on these OCS-related waterways. Navigation canals and other areas of high vessel traffic experience constant high turbidity. Seagrass beds near these areas will have already adjusted to turbid conditions. Vessel traffic related to a WPA proposed action would have little to no impact on seagrass communities. See Chapter 4.1.1.8.4 of the Multisale EIS for information about vessel traffic.

Dredging resuspends sediments and increases turbidity in nearby coastal waters. A WPA proposed action would contribute to maintenance dredging of existing navigation canals. The increment would be less than 1 percent, equal to the increment in vessel traffic for the navigation canals. Maintenance dredging would temporarily increase turbidity levels in the vicinity of dredging and disposal of materials. No new navigation channels are expected to be dredged as a result of a WPA proposed action. See Chapters 4.1.2.1.9, 4.1.3.3.3, and 4.2.1.1.3.3 of the Multisale EIS for information about dredging and navigation channels.

Summary and Conclusion

The routine activities associated with a CPA or WPA proposed action that would impact seagrasses include installation of pipelines in coastal waters, maintenance dredging of navigation canals, and vessel traffic. Turbidity impacts from pipeline installation and maintenance dredging would be temporary and localized. Pipeline routes would avoid seagrass beds. The increment of impacts from service-vessel transit would be minimal.

The MMS has reexamined the analysis for seagrasses presented in the Multisale EIS based on the additional information presented above. No significant new information was found that would alter the overall conclusion that impacts on seagrasses from routine activities associated with a CPA or WPA proposed action would be minimal. Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, its inclusion would add a minimal increment to the impacts on seagrasses.

4.1.3.3.3. Impacts of Accidental Events

Background/Introduction

A detailed description of accidental impacts upon seagrass communities can be found in Chapter 4.4.3.3 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Accidental impacts associated with a CPA or WPA proposed action that could adversely affect seagrass beds include oil spills associated with the transport and storage of oil (Chapter 4.3.1 of the Multisale EIS). The degree of impact from oil spills depends on the location of the spill, oil-slick characteristics, water depth, currents, and weather. Offshore oil spills that occur in the proposed action areas are much 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. In this region of the Gulf, seagrass beds remain submerged due to the short range of the micro-tides (usually about 0.5 m or 1.64 ft; Thieler and Hammar-Klose, 2006). During calm weather, oil on the sea surface would not contact most seagrass directly. Rough weather can produce increased mixing that would bring oil below the surface and result in oil contacting seagrass communities directly. Their regenerative roots and rhizomes are buried in the water bottom, where they are further protected (Chapter 3.2.1.3 of the Multisale EIS).

Should an oil slick pass over these seagrass communities, damage would occur if an unusually low tide were to occur, causing contact between the two. This is more likely in the winter with cold fronts from the north accompanied by a strong north wind. A more damaging scenario would be that a slick might pass over and remain over a submerged bed of vegetation in a protected embayment during typical fair-weather conditions. This would reduce light levels in the bed. If light reduction continues for several days, chlorophyll content in the leaves will be reduced (Wolfe et al., 1988), causing the grasses to yellow and reducing their productivity. Shading by an oil slick of the sizes described should not last long enough to cause mortality, depending upon the slick thickness, currents, weather, and the nature of the embayment. In addition, a slick that remains over seagrass beds in an embayment also will reduce or eliminate oxygen exchange between the air and the water of the embayment. Oxygen depletion is a serious problem for seagrasses (Wolfe et al., 1988). If currents flush little oxygenated water between the embayment and the larger waterbody and if the biochemical oxygen demand (BOD) is high, as it would be in a shallow water bed of vegetation, and then enhanced by an additional burden of oil, the grasses and related epifauna will be stressed and perhaps suffocated. In this situation, the degree of suffocation will depend upon the reduced oxygen concentration and duration of those conditions. Oxygen concentrations and their duration depend upon currents, tides, weather, temperature, percentage of slick coverage, and BOD.

Should weather conditions or currents increase water turbulence sufficiently, a substantial amount of oil from the surface slick will be dispersed downward into the water column. There it will adsorb to suspended particles in the water column, becoming less buoyant. Submerged vegetation reduces water velocity, promoting sedimentation among the vegetation. Typically, this oily sedimentation will not cause long-term or permanent damage to the seagrass communities. Some dieback of leaves would be expected for one growing season. In a severe case where high concentrations of hydrocarbons are mixed into the water column, the diversity or population of epifauna and benthic fauna found in seagrass beds could be impacted. Seagrass epiphytes are sessile plants that grow attached to their seagrass host; they play an important role in the highly productive seagrass ecosystem. The small animals, such as amphipods, limpets and snails, would likely show more lethal effects than the epiphytic plant species. Some fauna are more susceptible to oil impacts than others. Crustaceans, such as amphipods, are more sensitive than most molluscs. Even some species of amphipods are more sensitive than others. Species with higher tolerance, fast growth, or high recruitment typically recover more quickly than sensitive species. The lack of grazers could cause stress to the seagrass as a result of epiphyte overgrowth and shading. No permanent loss of seagrass habitat is projected to result from a spill unless an unusually low tidal event allows direct contact between the slick and the vegetation. Seagrass stands usually recover from oil impacts in about a year, with subsequent rapid colonization by fauna. However, it may take as much as 5-10 years of community succession before faunal composition resembles pre-impact conditions (Chan, 1977; Zieman et al., 1984; NRC, 1985 and 2003; Marshall, 1996).

Because of the location of most submerged aquatic vegetation, inshore spills pose the greatest threat to them. Such spills may result from either vessel collisions that release fuel and lubricants or from pipelines that rupture. If an oil slick settles into a protective embayment where seagrass beds are found, shading may cause reduced chlorophyll production; shading for more than about 2 weeks could cause thinning of leaf density. Under certain conditions, a slick could reduce dissolved oxygen in an embayment and cause stress to the bed and associated organisms due to reduced oxygen conditions. These light and oxygen problems can correct themselves once the slick largely vacates the embayment and light and oxygen levels are returned to pre-slick conditions.

Increased water turbulence due to storms or vessel traffic will break apart the surface sheen and disperse some oil into the water column, as well as increase suspended particle concentration, which will adsorb the dispersed oil. Typically, these situations will not cause long-term or permanent damage to the seagrass beds, although some dieback of leaves is projected for one growing season. Although the probability of their occurrence is low, the greatest threat to inland, seagrass communities would be from an inland spill resulting from a vessel accident or pipeline rupture. Although a resulting slick may cause minor impacts to the bed, equipment and personnel used to clean up a slick over shallow seagrass beds may generate the greatest direct impacts to the area. Associated foot traffic may work oil farther into the sediment than would otherwise occur. Scarring may occur if an oil slick is cleaned up over a shallow submerged aquatic vegetation bed where vessels, booms, anchors, and personnel on foot would be used and scar the bed. Close monitoring and restrictions on the use of bottom-disturbing equipment would be needed to avoid or minimize those impacts. As mandated by OPA 90, seagrass beds and live-bottom communities are expected to receive individual consideration during spill cleanup.

CPA Proposed Action Analysis

Seagrass beds adjacent to the CPA are restricted to small shallow areas behind barrier islands in Mississippi and Chandeleur Sounds and to smaller, more scattered populations elsewhere. Lower-salinity seagrass beds are found inland and discontinuously throughout the coastal zone of Louisiana and Mississippi.

The greatest threat to seagrass communities would be from inland spills. Based on the assumption that spill occurrence is proportional to the volume of oil handled, sensitive coastal environments in eastern Louisiana, from Atchafalaya Bay to east of the Mississippi River, including Barataria Bay, have the greatest risk of being contacted by spills from operations related to a CPA proposed action. Spills that could occur in coastal waters from proposed action support operations are estimated at 46-102 spills for a CPA proposed action over its 40-year life.

Offshore oil spills that occur in the proposed action area are much 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. The probabilities of an offshore spill ≥1,000 bbl occurring and contacting environmental features are described in Chapter 4.3.1.8 of the Multisale EIS and **Chapter 3.2.1** of this SEIS. Eight parishes in Louisiana and two counties in Texas have a chance of spill contact that is greater than 0.5 percent. For these parishes and counties, the chance of an OCS offshore spill ≥1,000 bbl ranges from 1 to 16 percent. In Louisiana, the Deltaic Plain area has the highest risk from a CPA proposed action (Chapter 4.3.1 of the Multisale EIS).

As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. Activity that would result from the addition of the 181 South Area would cause a negligible increase in the risk of a large spill occurring and contacting seagrass beds.

WPA Proposed Action Analysis

Seagrass communities in the WPA are widely scattered beds in shallow, high-salinity coastal lagoons and bays. The most extensive seagrass beds are found in both the Upper and Lower Laguna Madre along the Texas coast, as well as Baffin Bay. In the Texas Laguna Madre, seagrass meadows are the most common submerged habitat type.

Inshore spills are the greatest threat to seagrass communities in the WPA. Inshore vessel collisions may release fuel and lubricant oils, and pipeline ruptures may release crude and condensate oil. The Galveston/Houston/Texas City area has the greatest risk of experiencing coastal spills related to a WPA proposed action. Spills that could occur in coastal waters from proposed action support operations are estimated at 15-34 spills for a WPA proposed action over its 40-year life.

Offshore oil spills that occur in the proposed action area are much 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. The probabilities of an offshore spill ≥1,000 bbl occurring and contacting environmental features are described in Chapter 4.3.1.8 of the Multisale EIS. Six counties in Texas and one parish in Louisiana have a chance of spill contact that is greater than 0.5 percent. For these counties, the chance of an OCS offshore spill ≥1,000 bbl occurring and reaching the shoreline ranges from 1 to 5 percent as the result of a proposed action over its 40-year life. Should a spill ≥1,000 bbl occur offshore from activities resulting from a WPA proposed action, the seagrass communities with the highest probabilities of contact within 10 days would be those located within Matagorda County, Texas, for a WPA proposed action.

Summary and Conclusion

Because of the location of most submerged aquatic vegetation, inshore spills pose the greatest threat. Such spills may result from either vessel collisions that release fuel and lubricants or from pipelines that rupture. Nearshore spills are much smaller in volume and weather quickly. Should they occur, these impacts would be considered short term in duration and minor in scope. Although a resulting slick may cause minor impacts to the bed, equipment and personnel used to clean up a slick over shallow seagrass beds may generate the greatest direct impacts to the area. Associated foot traffic may work oil farther into the sediment than would otherwise occur. Scarring may occur if an oil slick is cleaned up over a shallow submerged aquatic vegetation bed where vessels, booms, anchors, and personnel on foot would be used and scar the bed. Close monitoring and restrictions on the use of bottom-disturbing equipment would be needed to avoid or minimize those impacts.

The MMS has reexamined the analysis for seagrass communities presented in the Multisale EIS, based on the additional information presented above. This new information supports the previous assessments contained in the Multisale EIS, which is incorporated by reference. No significant new information was found that would alter the overall conclusion that impacts on seagrass communities from accidental impacts associated with a CPA or WPA proposed action would be minimal.

4.1.3.3.4. Cumulative Impacts

Background/Introduction

A detailed description of cumulative impacts upon seagrass communities can be found in Chapter 4.5.3.3 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

This cumulative analysis considers the effects of impact-producing factors related to a CPA and WPA proposed action, prior and future OCS activities, State oil and gas activities, other governmental and private projects and activities, and pertinent natural processes and events that may adversely affect seagrass communities and associated habitat during the life of a proposed action. Impact-producing factors relevant to the cumulative analysis include pipelines, canal dredging, channelization and other water control structures, scarring from vessel traffic, oil spills, and hurricanes. Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, the only cumulative effect produced by its addition to a CPA or WPA proposed action is a small increase in the incremental impacts of vessel traffic.

Pipeline construction projects can affect seagrass habitats in a number of ways. Jetting of trenches for pipeline burial in water shallower than 200 ft (61 m) displaces sediments. Although the majority of materials resuspended by jetting returns to the water bottom within a few feet or meters of the trench, lighter materials can be carried for several miles or kilometers. Permits from State agencies and COE for constructing pipelines require that turbidity impacts be mitigated. Pipeline installation is very infrequent and impacts are considered insignificant. About 100 active OCS pipelines currently make landfall and about 32-47 new pipelines are projected to make landfall during the 40-year life-span of the proposed actions. No additional new pipelines are projected to make landfall as a result of the addition of the 181 South Area.

Dredge and fill activities are the greatest threats to submerged vegetation and seagrass habitat (Wolfe et al., 1988). New canals and related disposal of dredged material create significant changes in regional hydrodynamics and associated erosion. Turbidity caused by dredging produces the most impacts to seabeds by sedimentation and reduction of light available to fuel photosynthesis. Canals also affect submerged vegetation inshore by increasing the shoreward penetration of high salinity water to areas that harbor estuarine and freshwater species. Channel dredging to facilitate, create, and maintain waterfront real estate, marinas, and waterways will continue to be a major impact-producing factor in the proposed cumulative activity area.

Channelization of the Mississippi River diverted the natural flow of sediments away from the delta, funneling it into deep waters of the Gulf of Mexico. Compaction of previously deposited sediments and accumulated layers of marsh accretion lead to subsidence. Also, natural drainage patterns along many areas of the coast have been severely altered by construction of the Gulf Intracoastal Waterway and other channelization projects. Saltwater intrusion, as a result of river channelization and canal dredging, is a major cause of coastal habitat deterioration (including seagrass communities) (Tiner, 1984; National Wetlands Inventory Group, 1985). Further compounding this impact, the suspended sediment load in the Mississippi River has decreased more than 50 percent since the 1950's, largely as a result of dam and reservoir construction (Turner and Cahoon, 1988) and soil conservation practices in the drainage basin. Spillway openings cause sudden changes in the salinity regime and have been associated with as much as a 16 percent loss in seagrass vegetation acreage (Eleuterius, 1987).

The scarring of seagrass beds by vessels is an increasing concern. The greatest scarring of seagrasses is caused by small boats and occurs in the vicinities of the greatest human population and boat registration densities. Scarring most commonly occurs in seagrass beds that occur in water depths shallower than 6 ft (2 m) as a result of boats of all classes operating in water that is too shallow. Other causes include anchor drags, trawling, trampling, and loggerhead turtles (especially in seagrass habitat off the coast of Florida) (Sargent et al., 1995; Preen, 1996). Recently, seismic activity in areas supporting seagrass nursery habitat has become a focus of concern for Texas State agencies. Scarring may have a more critical effect on habitat functions in areas with less submerged vegetation. Some local and State governments have instituted management programs to reduce scarring. Initial results indicate that scarring can be reduced.

Oil spills alone would typically have very little impact on seagrass communities and associated epifauna. The floating nature of oil and the regional microtidal range serve to limit direct contact with seagrass. However, wave action can mix oil into the water column and increase impacts to seagrass communities. Unusually low tidal events would also increase the risk of oil having direct contact with the vegetation. Epifauna residing in seagrass beds would be more heavily impacted than the vegetation itself. Oiling of seagrass beds would result in die-back of the vegetation and associated epifauna, which would be replaced for the most part in 1-2 growing seasons. Little or no direct mortality of seagrass beds is expected as a result of oil spills. Contact of seagrasses with crude or refined oil products has been implicated as a causative factor in the decline of seagrass beds and in the observed changes in species composition within them (Eleuterius, 1987). The cleanup of slicks in shallow, protected waters (<5 ft or 1.5 m deep) can cause significant scarring and trampling of submerged vegetation beds. Oil spilled in Federal offshore waters is not projected to significantly impact submerged aquatic vegetation. Based on OCS spill rates, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action.

Seagrass beds have been repeatedly damaged by the natural processes of transgression from hurricane overwash of barrier islands. The Chandeleur Island chain has been hit by five storms in the past eight years (Michot and Wells, 2005). Storm-generated waves wash sand from the seaward side of the islands over the narrow islands and cut new passes through the islands. The overwashed sand buries seagrass beds on the back side of the islands. Over time, seagrass recolonizes the new sand flats on the shoreward side, and the natural processes of sand movement rebuild the islands. Recent hurricane impacts have produced changes in seagrass community quality and composition (Heck and Byron, 2006; Poirrier and Cho, 2002; Anton et al., 2006; May, 2007; Maiaro, 2007).

Summary and Conclusion

Impact-producing factors relevant to the cumulative analysis include pipelines, canal dredging, channelization and other water control structures, scarring from vessel traffic, oil spills, and hurricanes. Pipeline construction creates turbidity that reduces light availability and can cause sedimentation and direct burial of seagrass communities. Dredging generates the greatest overall risk to seagrass communities. Channel dredging to create and maintain waterfront real estate, marinas, and waterways will continue to cause the greatest impacts to higher salinity submerged vegetation. Mitigation, such as the use of turbidity curtains, may be required to reduce undesirable impacts of dredging. Large water control structures influence salinities in coastal areas, which in turn influence the location of seagrass communities and associated epifauna. Seagrass beds can be scarred by anchor drags, trampling, trawling, loggerhead turtles, occasional seismic activity, and boats operating in water that is too shallow for their keels or propellers. The greatest scarring results from small boats operating in the vicinities of large populations of humans and registered boats. Inshore oil spills present greater risks of adversely impacting submerged vegetation than do offshore spills. Wave action and extreme low tide events during a spill can cause direct contact of oil on seagrass. This will result in die-back of the seagrass vegetation and supported epifauna, which will be replaced, for the most, part within 1-2 growing seasons. The cleanup of slicks can cause significant scarring and trampling of submerged vegetation and seagrass beds. Hurricanes generate substantial overall risk to submerged vegetation from burial and eroding channels through seagrass beds. When combined with other stresses, impacted seagrass beds may fail to recover. The most effective mitigation for direct impacts to submerged vegetation beds is avoidance.

New information published since completion of the Multisale EIS is discussed above in the description of the affected environment and is incorporated into the impact analyses. No new OCS or non-OCS activities were found. New information supports the previous assessments contained in the Multisale EIS, which is incorporated by reference, and does not necessitate a reanalysis of the impacts for the proposed actions. The 181 South Area is nearly 130 mi (209 km) from the nearest coast and is expected to result in a small increase in the incremental impacts of vessel traffic. The analysis and potential impacts detailed in the Multisale EIS remains valid for this SEIS.

In general, a CPA or WPA proposed action would cause a minor incremental contribution to impacts on submerged vegetation from dredging, boat scarring, pipeline installations, and possibly oil spills. Dredging generates the greatest overall risk to submerged vegetation, and hurricanes cause direct damage to seagrass beds, which may fail to recover in the presence of cumulative stresses. A CPA or WPA proposed action would have a minor contribution to dredging from the maintenance of channels.

4.1.4. Continental Shelf Benthic Resources

4.1.4.1. Live Bottoms (Pinnacle Trend)

The MMS has reexamined the analysis for live bottoms (Pinnacle Trend) presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for live bottoms (Pinnacle Trend) presented in the Multisale EIS. The 181 South Area is located 127 mi (204 km) from the Pinnacle Trend region, and the pinnacle habitat is deep, 200-400 ft (60-120 m); therefore, activity associated with the 181 South Area would not impact live bottoms.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. The combination of its depth (200-400 ft or 60-120 m), separation from sources of impacts as mandated by the Live Bottoms (Pinnacle Trend) Stipulation, and a community adapted to sedimentation makes damage to the ecosystem unlikely from routine activities associated with a CPA proposed action. In the unlikely event that oil from a subsurface spill would reach the biota of Pinnacle Trend communities, the effects would be primarily sublethal for adult sessile biota and there would be limited incidences of mortality. Cumulative activities in the vicinity of the hard-bottom communities including natural disturbances, fishing, anchoring, and oil spills could cause severe damage that could threaten the survival of live-bottom communities. The incremental contribution of a CPA proposed action to the cumulative impacts is expected to be slight, and negative impacts should be restricted by the implementation of the Live Bottom (Pinnacle Trend) Stipulation and site-specific mitigations, the depths of the features, and water currents in the live-bottom area. No impacts are expected from a WPA proposed action because the Pinnacle Trend is over 300 mi (480 km) away; therefore, a WPA proposed action is not analyzed below.

4.1.4.1.1. Description of the Affected Environment

A detailed description of the biology of live bottoms can be found in Chapter 3.2.2.1.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

The northeastern portion of the Central Gulf of Mexico exhibits a region of topographic relief known as the "Pinnacle Trend" at the outer edge of the Mississippi-Alabama shelf between the Mississippi River and DeSoto Canyon. The 181 South Area is 127 mi (204 km) from the Pinnacle Trend region. The MMS has sponsored numerous studies providing information about these features (Brooks, 1991; CSA, 1992a; Thompson et al., 1999; CSA and GERG, 2001). A recent bathymetric survey by USGS has provided accurate, up-to-date imaging of the seafloor of the region (Gardner et al., 2002a). The Pinnacle Trend covers 70 MMS lease blocks where the MMS has applied the Live Bottom (Pinnacle Trend) Stipulation to protect the ecosystem. This area includes portions of the continental shelf, shelf break, and upper continental slope. The area also spans differing sediment regimes. The eastern part of the pinnacles area is covered with a thin, well-sorted layer of fine- to medium-grained quartzose sand from eastern continental rivers. The western portion is covered with fine silts, sands, and clays deposited by the Mississippi River (CSA, 1992a). The Mississippi River plume influences the distribution and abundance of sessile invertebrates within 70 km (43 mi) of the river delta and may produce a gradient of sedimentation and water-column turbidity throughout the Pinnacle Trend (Rezak et al., 1985; Dennis and Bright, 1988; Rezak et al., 1990; Gittings et al., 1992; CSA and GERG, 2001; Weaver et al., 2001). The pinnacles generally have a southwest to northeast trend with many of the groups and linear features oriented in this direction. The heavily indurated pinnacles provide a surprising amount of surface area for the growth of sessile invertebrates and attract large numbers of fish. Additional areas of hard bottom are located nearby on the continental shelf, outside the Pinnacle Trend.

Topography

The pinnacle region contains a variety of features from low-relief rocky areas to major pinnacles, as well as ridges, scarps, and relict patch reefs. This includes thousands of carbonate mounds ranging in size from less than a few meters (feet) in diameter to nearly a kilometer (mile). Most of these features are of low relief, 1-2 m (3-6 ft) or less, and some occur in quite extensive groups. Shallow depressions are a type of low-relief feature common in the pinnacle area, particularly in the western portion. These occur in large fields that do not follow depth contours. They are usually 5-10 m (16-33 ft) across and less than a meter (3 ft) in depth.

Reef-like mounds are the most widespread features in the pinnacle region. They range in height from 1-20 m (3-66 ft) and in width from a few meters to over one-half kilometer (a few yards to over a quarter of a mile). They are mostly along two major depth bands: 74-82 m (243-269 ft) and 105-120 m (345-394 ft). Patch reefs are small reef-like mounds about 2-12 m (6-39 ft) in diameter and 3-4 m (10-13 ft) in height that occur in many areas. Flat-topped reefs are large reef-like mounds that occur along the same isobath as patch reefs. They range from 75 to 700 m (245 to 2,300 ft) in diameter and from 7 to 14 m (23 to 46 ft) in height. The pinnacles are up to 20 m (66 ft) in height and can be over 500 m (1,640 ft) in diameter (Thompson et al., 1999; Brooks, 1991). Some reef-like mounds also occur outside the two major depth bands. Several clusters are found shoreward in 60-70 m (197-230 ft) of water.

Ridges are the largest features in the area. These ridges are typically about 20 m (66 ft) wide (up to 250 m or 820 ft) and over 1 km (0.6 mi) long. Most of the ridges are low relief, around 1 m (3 ft) in height, but some have scarps up to 8 m (66 ft) high. They often occur in groups of 6-8 ridges (Brooks, 1991).

Ecology

The pinnacle features provide a significant amount of hard substrate for colonization by suspension-feeding invertebrates and support relatively rich live-bottom and fish communities. The diversity and abundance of the associated species appear to be related to the size and complexity of the features, with the low-relief rock outcrops (<1 m or 3 ft height) typically having low faunal densities, and higher relief features having the more diverse faunal communities. Features tall enough to rise above the common effects of turbidity have higher community diversity and density. The crests of the pinnacles are perhaps slightly more diverse than the walls.

Substrate characteristics and turbidity are major factors determining the composition of communities at different locations and depth levels in the Pinnacle Trend. The biological communities on the Pinnacle Trend become more diverse toward the east and with greater distance from the Mississippi River. To the east, the crests and walls of pinnacles are dominated by low-growing ahermatypic hard corals. This is a matter of both substrate and turbidity. Resuspension of sediments is a major contributor to turbidity in the Pinnacle Trend. This is more severe in the western part of the area because of the silty sediments deposited by the Mississippi River. Resuspension is caused by currents and wave action. The animals in this region are well-adapted to the effects common to this frequently turbid environment. The end result of these factors is that communities closer to the Mississippi River are less diverse and communities near the bottom are less diverse.

The characteristics of the substrate have a high degree of control over the composition of the biological communities that live on it. The more complex the shape of the substrate, the greater the variety of habitats for organisms. Assemblages of ahermatypic stony corals, coralline algae, sponges, octocorals, crinoids, bryozoans, and fishes are present at the tops of the shallowest features in water depths of less than 70 m (230 ft). On the deeper features, as well as along the sides of these shallower pinnacles, ahermatypic corals may be locally abundant, along with octocorals, crinoids, and basket stars. Horizontal surfaces have a considerably higher biological cover with more species than vertical surfaces. The tops of reefs with extensive flat summits are dominated by the taller gorgonian corals, as well as by sponges and crinoids. It is likely that sedimentation limits the colonization of low-growing species, such as many of the ahermatypic hard corals. Shallow depressions and low mounds harbor some organisms but the potential is limited. A pinnacle 20 m (66 ft) tall with slopes, cliffs, crevices, and overhangs may host the maximum number of species and a high density of animals.

Diversity and density of epibenthic organisms varies considerably between features in the Pinnacle Trend area. Areas with more exposed hard bottom, vertical relief, rugosity, and complexity of the substrate have higher biological diversity and density. The association of multiple features in proximity to one another makes an area more biologically diverse and promotes higher densities of organisms than an area with fewer, more scattered features. The Pinnacle Trend reef tract forms a major ecosystem with an influence that pervades the wider regional ecosystem. The general trend is less turbid and has greater biological development toward the east. In addition, the sediment is less silty to the east. This results in an increase of diversity and density of organisms to the east. Other factors such as relief, rugosity, and the incidence of light contribute to local differences in community structure.

A search was conducted for new information published since completion of the Multisale EIS. Various Internet sources were examined to determine any recent information regarding the Pinnacle Trend. Sources investigated include USGS, NOAA, USEPA, and coastal universities. Other sites were found through general Internet searches.

Additional information was found regarding ongoing USGS studies conducted to support MMS management (Gardner et al., 2002b; USDOI, GS, 2003; Weaver et al., 2001). The USGS Florida Integrated Science Center's pinnacles project works to identify patterns of demersal fish distribution, community structure, and trophic relationships associated with reef-like carbonate banks and mounds in the Pinnacle Trend area (USDOI, GS, 2003). The present research seeks to further define the basis of physical-biological coupling, aspects of community structure and function, biotope affinities, and critical habitat parameters for hard-bottom areas in the eastern Gulf of Mexico. This work enhances the understanding of the Pinnacle Trend's regional ecosystem to support MMS management and decisionmaking. This new information on the Pinnacle Trend supports and reinforces the description of the environment presented in the Multisale EIS.

4.1.4.1.2. Impacts of Routine Events

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA proposed action on Pinnacle Trend communities is presented in Chapters 4.2.2.1.4.1.1 of the Multisale EIS. No impacts are expected from a WPA proposed action because the Pinnacle Trend is over 300 mi (480 km) away. The routine activities associated with a 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. The 181 South Area is 127 mi (204 km) from the Pinnacle Trend region. Passing service vessels would be the only likely connection between the two areas. Since the pinnacle habitat is deep, 200-400 ft (60-120 m), it is unlikely that any effect could result unless a transiting vessel has a catastrophic accident in the Pinnacle Trend region.

The Live Bottom (Pinnacle Trend) Stipulation is described in detail in Chapter 2.4.1.3.2 of the Multisale EIS. It is a mitigating measure for leases resulting from a proposed action. 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 pinnacles.

Anchoring is potentially the most damaging impact, having the ability to destroy lush biological assemblages and damage the structure of the pinnacles themselves. Anchors can destroy a swath of habitat by being dragged over the seafloor, or the anchor chain can sweep a wide area of the seafloor. Anchor damage from support boats and ships, floating drilling units, and pipeline-laying vessels greatly disturb areas of the seafloor and are the greatest threats to live-bottom areas at these depths.

Infrastructure and pipelines could be placed over pinnacle habitat, crushing the benthic community and damaging the structure of the habitat itself. While damage from a pipeline would likely affect a very limited area, the associated anchors and anchor chain/cables of a traditional pipelaying barge could devastate a wide swath of habitat along each side of the pipeline route.

Both explosive and nonexplosive structure-removal operations will disturb the seafloor and potentially affect nearby pinnacle communities. Structure removal using explosives suspends sediments that will settle on nearby biotic communities. However, since the pinnacle habitat is near the outflow of the Mississippi River, it is colonized by organisms that are adapted to high turbidity and sedimentation. Explosive structure removals create shock waves, which harm biota in the immediate vicinity. Organisms with swim bladders, such as fish, are most affected by blasts; most stationary benthic animals are remarkably resistant to these effects (O'Keeffe and Young, 1984).

Discharges of drilling cuttings and fluids can affect benthic organisms in the immediate vicinity of the activity. Cuttings can build layers up to 30 cm (12 in) thick near the well, smothering most sessile organisms. In addition, the cuttings can contain contaminants that are detrimental to the growth and development of organisms. However, studies have shown little effect of cuttings and fluids near communities of the Pinnacle Trend (Shinn et al., 1993). These organisms are adapted to environments with high sedimentation. The proposed Live Bottom (Pinnacle Trend) Stipulation would prohibit physical impacts to Pinnacle Trend features. Mitigations based on NTL 2004-G05 prohibit bottom-disturbing activities within 30 m (100 ft) to further ensure protection.

Produced-water discharges contain high amounts of dissolved solids and total organic carbon, and low dissolved oxygen. Other common components include heavy metals, elemental sulfur and sulfide, organic acids, treating chemicals, and emulsified and particulate crude oil constituents. Salinity of produced water can vary from 0 to 300 ppt. These products, if discharged directly on Pinnacle Trend habitats, would have harmful effects on the community. The proposed Live Bottom (Pinnacle Trend) Stipulation would prohibit physical impacts to Pinnacle Trend features. Mitigations based on NTL 2004-G05 prohibit bottom-disturbing activities within 30 m (100 ft) to further ensure protection.

CPA Proposed Action Analysis

The routine activities associated with a 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.

For a CPA proposed action, 43-51 exploration/delineation and development wells and 5-6 production structures are projected for offshore Subareas C0-60 (east of the Mississippi River) and C60-200. The pinnacle blocks make up only 2 percent of the blocks in Subarea C0-60 (eastern) and 6 percent of the blocks in Subarea C60-200. These areas are expected to have 5-6 structures removed, with four of them using explosives. About 10-130 km (6-81 mi) of new pipeline installation is projected in offshore Subarea C0-60 (east of the Mississippi River). Approximately 119,000-241,000 service-vessel trips are expected to result from the proposed action for the entire CPA.

Anchoring is potentially the most damaging impact but, with the low number of structures to be installed near the Pinnacle Trend region, the likelihood of damage to the habitat is low. Most vessels will travel to other locations, only sometimes transiting the pinnacle region. The Live Bottom (Pinnacle Trend) Stipulation would prohibit activities from causing direct impacts to Pinnacle Trend communities.

The Pinnacle Trend region comprises only a small percentage of its two larger subareas (2% and 6%). Very little new infrastructure is expected in the pinnacle region. If the proposed lease stipulation is applied and followed, the benthic community should suffer no damaging impacts. None have been reported in the past. Trenching is not required for pipelines in the depths found at the Pinnacle Trend (60-120 m or 200-400 ft).

Only 5-6 removals are projected for the larger subareas encompassing the Pinnacle Trend. Four of these could be explosive removals. Any removals requested in the Pinnacle Trend area will be scrutinized very carefully. Options will be explored for using alternative methods during removals to minimize potential impact to surrounding hard-bottom communities. Site clearance techniques will be of particular concern and may require remote-sensing surveys to identify and recover debris. The Live Bottom (Pinnacle Trend) Stipulation requirements to protect the habitat would take precedence.

New drill cuttings and fluid discharges will be added by only the few new production structures (5-6) that are projected for the larger subareas as a result of a CPA proposed action. The comparatively small area of the Pinnacle Trend would be protected from direct discharges on sensitive habitat by the Live

Bottom (Pinnacle Trend) Stipulation. The depth of the habitat (60-120 m or 200-400 ft) favors dispersion of surface discharges and dilution before it reaches sensitive organisms.

Produced-water discharges would be separated from sensitive, hard-bottom habitat the same as drill cuttings and fluids. Discharges would disperse and dilute before reaching the relatively deep habitats. The proposed Live Bottom (Pinnacle Trend) Stipulation would prohibit physical impacts to Pinnacle Trend features. Mitigations based on NTL 2004-G05 prohibit bottom-disturbing activities within 30 m (100 ft) to further ensure protection.

Summary and Conclusion

The routine activities associated with a CPA proposed action that would impact Pinnacle Trend communities include anchoring, infrastructure and pipeline emplacement, infrastructure removal, drilling discharges, and produced-water discharges. The 181 South Area is 127 mi (204 km) from the Pinnacle Trend region; therefore, passing service vessels would be the only likely connection between the two areas. Since the pinnacle habitat is deep, 200-400 ft (60-120 m), it is unlikely that any effect could result unless a transiting vessel has a catastrophic accident in the Pinnacle Trend region. No impacts are expected from a WPA proposed action because the Pinnacle Trend is over 300 mi (480 km) away. The combination of its depth (200-400 ft or 60-120 m), separation from sources of impacts as mandated by the Live Bottom (Pinnacle Trend) Stipulation, and a community adapted to sedimentation makes damage to the ecosystem unlikely. Pipeline routes would avoid Pinnacle Trend habitat. Anchor damage and infrastructure emplacement is prohibited on the habitat.

The MMS has reexamined the analysis for the Pinnacle Trend presented in the Multisale EIS, based on the additional information presented above. No significant new information was found that would alter the overall conclusion that impacts on the Pinnacle Trend from routine activities associated with a CPA proposed action would be minimal.

4.1.4.1.3. Impacts of Accidental Events

Background/Introduction

A detailed description of accidental impacts on live bottom (Pinnacle Trend) communities can be found in Chapter 4.4.4.1.1 of the Multisale EIS. Chapter 2.4.1.3.2 of the Multisale EIS contains a complete description and discussion of the proposed Live Bottom (Pinnacle Trend) Stipulation. No impacts are expected from a WPA proposed action because the Pinnacle Trend is over 300 mi (480 km) away. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Accidental disturbances resulting from a CPA proposed action, including oil spills, blowouts, chemical spills, and vessel collisions, have the potential to disrupt and alter the environmental, commercial, recreational, and aesthetic values of the Pinnacle Trend in the CPA.

Oil spills potentially affecting the Pinnacle Trend and its biological communities could result from surface and seafloor spills. Both surface and subsurface spills could result in a steady discharge of oil over a long period of time. Surface oil spills may occur as a result of platform or tanker spills. The shallowest depth of the Pinnacle Trend features in the northern Gulf of Mexico (60 m or 200 ft) should protect the community from surface oil slicks. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10-m (33-ft) depth, although modeling exercises have indicated such oil may reach a depth of 20 m (66 ft). At this depth, the oil is found at concentrations several orders of magnitude lower than the amount shown to have an effect on corals (Lange, 1985; McAuliffe et al., 1975 and 1981; Knap et al., 1985). Any dispersed oil that reaches the benthic community would be expected to be at concentrations of less than 1 ppm. Such low oil concentrations would not be life threatening to larval or adult stages at that depth (Fucik et al., 1994). Because the crests of Pinnacle Trend features in the northern Gulf are found well below 10 m (33 ft), no concentrated oil from a surface spill is expected to reach their sessile biota.

Seafloor spills could be caused by a tanker accident, pipeline rupture, or well blowout. However, a subsurface spill should rise to the surface. Evidence from a recent experiment in the North Sea indicates that oil released during a deepwater blowout or pipeline rupture would quickly rise to the surface and form a slick (Johansen et al., 2001). Impacts from a deepwater oil spill would occur in the water column and at the surface where the oil would be mixed into the water and dispersed by wind waves. If some oil were to contact Pinnacle Trend habitat, the impacts would be primarily sublethal with the disruption or impairment of a few elements at the local scale, but no interference to the general system performance would occur. The sublethal effects could be long lasting and affect the resilience of coral colonies to natural disturbances (e.g., elevated water temperature and diseases) (Jackson et al., 1989). It is anticipated that potential recovery for such an event would occur within a period of 2 years (USDOC, NOAA, Office of Response and Restoration, 2007; Shigenaka, 2001; Rice et al., 1983). However, due to the application of the proposed Live Bottom (Pinnacle Trend) Stipulation, drilling would not occur within 30 m (100 ft) of a No Activity Zone, so blowouts would not occur in the immediate vicinity of the Pinnacle Trend and associated biota. Therefore, hazardous concentrations of oil would be unlikely to reach the Pinnacle Trend. The Pinnacle Trend community exists in a relatively turbid environment, starting just 65 km (40 mi) east of the mouth of the Mississippi River and trending to the northeast. Therefore, sediment from a blowout, if it occurred nearby, would not harm the community. Oil adsorbed to the sediment would likely have a sublethal impact on biota.

Common OCS-related chemicals spilled are methanol, ethylene glycol, zinc bromide, and ammonium chloride. Two chemicals could potentially impact the marine environment—zinc bromide and ammonium chloride (Boehm et al., 2001). Most other chemicals are either nontoxic or used in small quantities. Precipitation of zinc in marine waters would minimize the potential for impact. Ammonium chloride disassociates to temporarily elevate the levels of ammonia in the spill vicinity, but it is unlikely this would reach the depths of the Pinnacle features. Chemical dispersants can be used in remediation of oil spills to promote mixing with the water and faster degradation. This would be applied on the sea surface and would be thoroughly diluted before reaching the Pinnacle Trend community.

Vessel collisions can result in spills of oils, fuels, and chemicals. Collision of a service vessel with a platform could result in spills from the vessel, the platform, or both. It could also cause a moored structure to drag anchors or break loose from anchors and subsequently impact a Pinnacle Trend feature. A collision could potentially result in the sinking of a vessel with direct physical impacts to a Pinnacle Trend feature. If a sunken vessel landed on or near a sensitive habitat, leaking fluids could contact the habitat directly. From 1996 to 2005, there were 129 OCS-related collisions, mostly with platforms or pipeline risers. Diesel fuel is the product most frequently spilled, while corrosion inhibitor, hydraulic fluid, lube oil, and methanol have also been released. Approximately 10 percent of vessel collisions with platforms in the OCS caused diesel spills. Minimal impacts result from a spill since diesel is light and will evaporate and biodegrade within a few days.

A search was conducted for new information published since completion of the Multisale EIS. Various Internet sources were examined to determine any recent information regarding the Pinnacle Trend. Sources investigated include USGS, NOAA, USEPA, and coastal universities. Other sites were found through general Internet searches.

Since Hurricanes Katrina and Rita in 2005, MMS has identified 154 spills of petroleum products of ≥1 bbl, totaling 17,077 bbl that were lost from platforms, rigs, and pipelines on the Federal OCS (USDOI, MMS, 2007e). Approximately 600 petroleum spills of <1 bbl on the Federal OCS related to the 2005 hurricanes have been reported to the National Response Center (NRC). These NRC reports totaled to <50 bbl and averaged approximately 3 gallons each in size. These spills of <1 bbl dissipate quickly due to evaporation, dispersion by the winds and currents, and dilution by the ocean waters. These small releases generally do not cause identifiable environmental impacts out in the open ocean. There were no accounts of environmental consequences resulting from spills on the OCS identified with Hurricanes Katrina and Rita. The final estimation of the total spillage associated with Hurricanes Katrina and Rita will not be complete until the conclusion of recovery efforts continuing through 2007 and into 2008.

CPA Proposed Action Analysis

The Pinnacle Trend is protected from impacts by oil and gas activity by MMS and it occupies 70 MMS lease blocks in the northeastern portion of the CPA. These blocks represent a small fraction of the continental shelf area in the CPA.

The fact that the Pinnacle Trend 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 Pinnacle Trend. The shallowest water depth over any features of the Pinnacle Trend in the CPA is about 200 ft

(60 m). When surface spills are mixed into the water column, the oil is not expected to penetrate below a depth of about 33 ft (10 m). As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. Activity that would result from the addition of the 181 South Area would cause a negligible increase in the risk of a large spill occurring and contacting seagrass beds.

Approximately 3-4 blowouts are projected to occur in the CPA during activities resulting from the proposed actions. With the application of the proposed stipulations, none of these blowouts should occur within 100 ft (30 m) of a Pinnacle Trend feature. Furthermore, blowouts near Pinnacle Trend features are unlikely to impact the biota because oil will rapidly float to the surface.

Since collisions occur infrequently, the potential impacts to the Pinnacle Trend in the CPA are not expected to be significant. Chemical spills are also infrequent, of small quantity, and usually occur in surface waters. No significant impacts to the Pinnacle Trend in the CPA are expected.

The proposed Live Bottom (Pinnacle Trend) Stipulation would assist in preventing most of the potential impacts from oil and gas operations including accidental oil spills, blowouts, vessel collisions, and chemical spills on the biota of Pinnacle Trend.

Summary and Conclusion

Contact with accidentally spilled oil would cause lethal and sublethal effects in benthic organisms. The oiling of benthic organisms is not likely because of the small area of the Pinnacle Trend compared with the entire CPA, the scattered occurrence of spills, the depth of the features, and because the proposed Live Bottom (Pinnacle Trend) Stipulation would keep subsurface sources of spills away from the immediate vicinity of Pinnacle Trend features. In the unlikely event that oil from a subsurface spill would reach the biota of Pinnacle Trend communities, the effects would be primarily sublethal for adult sessile biota and there would be limited incidences of mortality.

The MMS has reexamined the analysis for the Pinnacle Trend presented in the Multisale EIS, based on the additional information presented above. This new information supports the previous assessments contained in the Multisale EIS, which is incorporated by reference. No significant new information was found that would alter the overall conclusion that impacts on Pinnacle Trend communities from accidental impacts associated with a CPA proposed action would be minimal. No impacts are expected from a WPA proposed action because the Pinnacle Trend is over 300 mi (480 km) away.

4.1.4.1.4. Cumulative Impacts

Background/Introduction

A detailed description of cumulative impacts on live bottom (Pinnacle Trend) communities can be found in Chapter 4.5.4.1.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

This cumulative analysis considers the effects of impact-producing factors related to the proposed actions plus those related to prior and future OCS lease sales, and to tanker and other shipping operations that may occur and adversely affect live bottom (Pinnacle Trend) communities. Non-OCS-related impacts, including natural disturbances, fishing, anchoring, and oil spills, have the potential to alter live bottoms. Specific OCS-related, impact-producing factors considered in the analysis are infrastructure emplacement and removal, anchoring, drilling discharges, produced waters, oil spills, blowouts, chemical spills, and vessel collisions. Because the 181 South Area is about 127 mi (204 km) from the Pinnacle Trend, the only cumulative effect produced by its addition to a CPA proposed action is a small increase in the incremental impacts of vessel traffic.

It is assumed protective stipulations for live bottoms will be part of appropriate OCS leases and existing site/project-specific mitigations will be applied to OCS activities on these leases or supporting activities on these leases.

Non-OCS activities have a greater potential to affect the hard-bottom communities of the region than MMS-regulated activities. Natural disturbances such as hurricanes and extreme fluctuations of environmental conditions (e.g., nutrient pulses, low dissolved oxygen levels, seawater temperature minima, and seasonal algal blooms) can affect live-bottom communities of the CPA. Because of the depth of the Pinnacle Trend area (200-400 ft or 60-120 m), waves seldom have a direct influence. Rather, wave action creates currents that can resuspend sediments to produce added turbidity and sedimentation. The animals in this region are well-adapted to the effects common to this frequently turbid environment.

Recreational boating and fishing may severely impact live-bottom communities. Numerous fishermen take advantage of the relatively shallow and easily accessible resources of the region and anchor at hard-bottom locations to fish. Bottom longlining could potentially result in cumulative impacts to live-bottom communities. If contact did occur, impacts from bottom longlines would be minimal. Damage resulting from bottom trawling would have a much greater impact. Ships anchoring near major shipping fairways of the CPA, on occasion, may impact sensitive areas located near these fairways.

Oil and chemical spills from non-OCS-related impacts could result from vessel collisions and other accidents. While an unlikely event (<1/yr), import tanker accidents could produce the largest offshore spills. These oil and chemical spills will have the same effect as described below for OCS-related impacts.

Oil and gas activities produce cumulative effects on the offshore environment. The Live Bottom (Pinnacle Trend) Stipulation prevents direct impacts to live-bottom communities. The placement of structures on the seafloor crushes organisms and can cause scouring of the surficial sediments (Caillouet et al., 1981). The effect of pipeline-laying activities on the biota of live-bottom communities would be restricted to the temporary resuspension of sediments, resulting in sublethal effects over small areas.

Explosive and nonexplosive structure-removal operations disturb the seafloor. Structure removal using explosives (the most common removal method) can suspend sediments, which settle much in the same manner as discussed below for muds and cuttings discharges. Shock waves in the seafloor are attenuated within 100 m (328 ft) from the structure (Baxter et al., 1982). Resuspended sediments would impact an area within a radius of approximately 1,000 m (3,281 ft). The explosive removal of structures is expected to have minimal effects on live-bottom communities.

Anchor damage from support boats and ships, floating drilling units, and pipeline-laying vessels are considered the greatest potential OCS-related threat to live-bottom areas. Anchoring can destroy a wide swath of habitat when a vessel drags or swings at anchor, causing the chain to drag across the seafloor. The proposed biological stipulation would limit the proximity of new activities to live bottoms and sensitive features. The misplacement of anchors could severely impact hard-bottom substrate, which has recovery rates (which are not well documented) estimated at 5-20 years depending on the severity.

Routine discharges of drilling muds and cuttings by oil and gas operations could smother organisms or produce less obvious sublethal toxic effects. Lease stipulations and site-specific mitigations would prevent drilling discharges directly over pinnacle habitat. Drilling discharges should reach undetectable concentrations in the water column within 1,000 m (3,281 ft) of the discharge point, thus limiting potential toxic effects to benthic organisms. Effects would diminish rapidly with increasing distance from the discharge area. The levels of contaminants in the water column and sediments are expected to be well below the new USEPA discharge regulations and permits (Chapter 4.1.3.4 of the Multisale EIS). The deposition of drilling muds and cuttings in live-bottom and pinnacle trend areas are not expected to greatly impact the biota of the pinnacles or the surrounding habitat. The impact from muds and cuttings discharged as a result of the cumulative scenario would be temporary, primarily sublethal in nature, and the effects would be limited to small areas. Recovery to pre-impact conditions from these sublethal impacts would take place within 10 years.

Produced waters would be discharged at the surface; the depth of the low-relief hard bottoms (>40 m or 131 ft), currents, and lateral offset of discharges would render the wastes harmless to any live-bottom habitat. Adverse impacts of cumulative activities would therefore be temporary, primarily sublethal in nature, and the effects would be limited to small areas. Predicted recovery to pre-impact conditions from these sublethal impacts would take place within 5 years.

Surface spills of oil can be mixed into the water column by wave turbulence. Measurable amounts have been documented down to a 10-m (33 ft) depth, and models have indicated such oil may reach a depth of 20 m (66 ft). Concentrations at these depths would be several orders of magnitude lower than the amount required to effect marine organisms (Lange, 1985; McAuliffe et al., 1975 and 1981). Since Pinnacle Trend features reside below 20-m (66-ft) water depth, surface spills would not impact the biota.

Evidence from Johansen et al. (2001) indicates that oil from subsurface pipeline spills are not expected to cause damage to live-bottom biota because the oil would rise rapidly to the sea surface. There is little probability that a subsurface oil spill will impact live bottoms since the proposed lease stipulation prevent the installation of pipelines in the immediate vicinity of live-bottom areas. The adverse impacts from subsurface oil spills on live bottoms would be minor in scope, primarily sublethal in nature, and the effects would be contained within a small area. Recovery to pre-impact conditions from these sublethal impacts could take place within 5-10 years.

Subsurface blowouts can resuspend sediments and release hydrocarbons into the water column near Pinnacle Trend communities. The continued implementation of lease stipulations and mitigations should prevent blowouts from occurring directly on live bottoms. A severe subsurface blowout within 400 m (1,312 ft) of a live bottom could result in the smothering of the biota due to sedimentation. Since much of the live-bottom biota is adapted to turbid conditions, most impacts would probably be sublethal, with recovery taking place within 5 years.

Common OCS-related chemicals spilled are methanol, ethylene glycol, zinc bromide, and ammonium chloride. The last two could potentially impact the marine environment; most other chemicals are either nontoxic or used in small quantities (Boehm et al., 2001). The effects of ammonium chloride would be rapidly diluted, and zinc quickly precipitates out of solution. Chemical dispersants used on the sea surface would be thoroughly diluted before reaching the Pinnacle Trend community.

Vessel collisions can result in spills of oils, fuels, and chemicals. If a sunken vessel landed on or near a sensitive habitat, leaking fluids could contact the habitat directly. Diesel fuel is the product most frequently spilled, while corrosion inhibitor, hydraulic fluid, lube oil, and methanol have also been released. Minimal impacts result from a spill since diesel is light and will evaporate and biodegrade within a few days. In the unlikely event a freighter, tanker, or other ocean-going vessel related to OCS Program activities sank and proceeded to collide with the pinnacle features or associated habitat releasing its cargo, recovery capabilities from such a catastrophic scenario are unknown at this time.

Should the Live Bottom (Pinnacle Trend) Stipulation not be implemented, OCS activities could have the potential to destroy part of the biological communities. The most potentially damaging of these are the impacts associated with physical damages that may result from anchors, structure emplacement, and other bottom-disturbing operations. The OCS Program, with the benefit of protective lease stipulations and site-specific mitigations, would have little adverse impact on Pinnacle Trend communities and habitat.

Summary and Conclusion

Non-OCS activities in the vicinity of the hard-bottom communities include natural disturbances, fishing, anchoring, and oil spills. These activities could cause severe damage that could threaten the survival of live-bottom communities. Ships using fairways in the vicinity of live bottoms anchor in the general area of live bottoms on occasion, and numerous fishermen take advantage of the relatively shallow and easily accessible resources of regional live bottoms. These activities could lead to severe and permanent physical damage. During severe storms, such as hurricanes, large waves may reach deep enough to stir bottom sediments. 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.

Impact-producing factors resulting from activities of OCS oil and gas operations include infrastructure emplacement and removal, anchoring, drilling discharges, produced waters, oil spills, blowouts, chemical spills, and vessel collisions. Long-term OCS activities are not expected to adversely impact the live-bottom environment if these impact-producing factors are restrained by the continued implementation of protective lease stipulations 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 live bottoms. The impact to the live-bottom resource as a whole is expected to be slight because of the projected lack of community-wide impacts. Because of the distance from the sensitive habitat, no effects are expected from activities located in the WPA. Activities associated with the 181 South Area would produce a small incremental increase in impacts due to navigational traffic.

Potential impact from oil spills ≥1,000 bbl would be restricted because of the depth of the features (>20 m (66 ft)), because subsea pipeline spills are expected to rise rapidly, and because of the low prospect of pipelines being routed immediately adjacent to live bottoms. The frequency of impacts to live bottoms should be rare and the severity slight. Impacts from accidents involving the misplacement of anchors on live bottoms could be severe in small areas (those actually crushed or subjected to abrasions).

The incremental contribution of a 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 and site-specific mitigations, the depths of the features, and water currents in the live-bottom area.

New information published since completion of the Multisale EIS is discussed above in the description of the affected environment and incorporated into the impact analyses. No new OCS or non-OCS activities were found. New information supports the previous assessments contained in the Multisale EIS, which is incorporated by reference, and does not necessitate a reanalysis of the impacts for the proposed actions. The 181 South Area is about 127 mi (204 km) from the Pinnacle Trend area and is expected to result in a small increase in the incremental impacts of vessel traffic. The analysis and potential impacts detailed in the Multisale EIS remains valid for this SEIS.

4.1.4.2. Topographic Features

The MMS has reexamined the analysis for topographic features presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for topographic features presented in the Multisale EIS. New information was found that supports the previous assessments contained in the Multisale EIS, which is incorporated by reference, and illustrates the potential effects of natural events, especially the cumulative impacts of hurricanes. Since the 181 South Area is 129 mi (207 km) from the nearest topographic feature, transiting service vessels would be the only likely impact from the 181 South Area on topographic features. Since the closest topographic feature habitats are deep, ≥56 m (184 ft) to their tops, it is unlikely that the 181 South Area would result in any effect unless a transiting vessel has a catastrophic accident near a bank.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. The routine activities associated with a CPA or WPA proposed action 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 would keep subsurface sources of spills away from the immediate vicinity of topographic features. Cumulative activities including natural disturbances, fishing, anchoring, treasure salving, and oil spills could cause severe damage that could threaten the survival of topographic feature communities. The incremental contribution of a CPA or WPA proposed action to the cumulative impact is expected to be slight, and negative impacts should be restricted by the implementation of the Topographic Feature Stipulation and site-specific mitigations, the depths of the features, and water currents in the topographic feature area.

4.1.4.2.1. Description of the Affected Environment

Some areas of the continental shelf in the CPA and WPA are characterized by topographic features that are inhabited by hard-bottom benthic communities. The habitat created by the topographic features is important for the following reasons:

(1) they support hard-bottom communities of high biomass, high diversity, and high numbers of plant and animal species;

(2) they support, either as shelter or food, or both, large numbers of commercially and recreationally important fishes;

(3) they are unique to the extent that they are small, isolated areas of such communities in vast areas of much lower diversity;

(4) they provide a relatively pristine area suitable for scientific research; and

(5) they have an aesthetically intrinsic value.

Figure 4-2 depicts the location of 37 known topographic features in the Gulf of Mexico; 16 in the CPA and 21 in the WPA. No topographic features are located in the 181 South Area.

The description of the biology of topographic features can be found in Chapter 3.2.2.1.2 of the Multisale EIS. Benthic organisms on these features are mainly limited by temperature, turbidity, and low light. Temperatures lower than 16 °C reduce coral growth, while temperatures in excess of 32 °C will impede coral growth and induce coral bleaching (loss of symbiotic zooxanthellae). Light penetration in the Gulf is limited by several factors, including depth and events of prolonged turbidity. Hard substrates favorable to colonization by coral communities in the northern Gulf are found on outer shelf, high-relief features.

In 1998, USGS, in cooperation with MMS and the Flower Garden Banks National Marine Sanctuary, surveyed the East and West Flower Garden Banks using high-resolution, multi-beam mapping techniques (Gardner et al., 1998). In 2002, they mapped 12 more topographic features, including Alderdice, Sonnier, Geyer, Bright, Rankin (1 and 2), Jakkula, McNeil, Bouma, McGrail, Rezak, and Sidner Banks (Gardner et al., 2002a). These surveys reveal complex bathymetry in some areas surrounding the banks outside the No Activity Zones. These small features surrounding the banks are considered important fish habitat and are protected by MMS from impacts of oil and gas activities. The depth of these banks reduces the effects of storms on the habitats. The most common influence of strong storms on these banks is an increase in turbidity, generally at the lower levels of the banks. Turbidity and sedimentation are normal in these lower levels because of the nepheloid layer and normal resuspension.

Severe hurricanes can cause physical damage to reef structure and organisms. In September 2005, Hurricane Rita passed over the northwestern Gulf of Mexico, affecting at least 18 topographic features. The MMS has conducted studies of select topographic features since Hurricane Rita. Long-term monitoring has continued on a yearly basis at the East and West Flower Garden Banks through an equal partnership between MMS and NOAA's National Marine Sanctuary program. Another MMS study, *Post-Hurricane Assessment of Sensitive Habitats of the Flower Garden Banks Vicinity* (Robbart et al., in preparation), is investigating hurricane effects at the East Flower Garden, Sonnier, McGrail, Geyer, and Bright Banks. Initial assessment of the East Flower Garden Bank reveals mechanical damage from Hurricane Rita and a significant bleaching event (up to 46% of corals). This was followed by an outbreak of coral disease affecting up to 8 percent of corals at the East Flower Garden Bank. These are the most severe recorded outbreaks of bleaching and disease at the Flower Garden Banks. Other preliminary results suggest little hurricane damage to McGrail, Geyer, and Bright Banks but severe damage at Sonnier Bank (Robbart et al., in preparation). Speculation is that Sonnier Bank was more affected because of its shallower depth and position on the east side of the storm track. It is also thought that repeated anchor damage has affected Sonnier Bank. Community recovery is expected to take at least 5 years if future anchor damage is prevented. Monitoring at the Flower Garden Banks in 2006 and 2007 shows good recovery of corals with no significant deterioration of community health (Precht et al., 2006 and 2008).

A search was conducted for additional new information published since completion of the Multisale EIS. Various Internet sources were examined to discover any recent information regarding topographic features. Sources investigated include USGS, NOAA, USEPA, and coastal universities. Other sites were found through general Internet searches.

One ongoing study of Sonnier Bank reports some preliminary results that indicate small shifts in benthic cover, including an increase in algae and a decrease in sponges (Rooker et al., in preparation). They also report some shifts in fish community composition. These shifts are likely the result of impacts from Hurricane Rita in September 2005.

This new information illustrates the potential effects of natural events, especially the cumulative impacts of hurricanes. Some change has been detected in habitats affected by Hurricane Rita, mostly the degradation of the reef community at Sonnier Bank. Other banks either had no substantive damage or are recovering well.

4.1.4.2.2. Impacts of Routine Events

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA or WPA proposed action on topographic feature communities (or banks) is presented in Chapters 4.2.2.1.4.1.2 and 4.2.1.1.4.1.1 of the Multisale EIS, respectively. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

The 181 South Area is 129 mi (207 km) from the nearest topographic feature.

The routine activities associated with a CPA or WPA proposed action that would impact topographic feature communities include anchoring, infrastructure and pipeline emplacement, infrastructure removal, drilling discharges, and produced water discharges.

The Topographic Features Stipulation is described in detail in Chapter 2.4.1.3.1 of the Multisale EIS. It is a mitigating measure for leases resulting from a proposed action. The stipulation is designed to prevent drilling activities and anchor emplacement from damaging the banks (the major potential impacting factors on these hard bottoms resulting from offshore oil and gas activities).

Anchoring is potentially the most damaging impact, having the ability to destroy lush biological assemblages and damage the structure of the banks themselves. Anchors can destroy a swath of habitat by dragging over the seafloor or the anchor chain can sweep a wide area of the seafloor. Anchor damage from support boats and ships, floating drilling units, and pipeline-laying vessels greatly disturb areas of the seafloor and are the greatest threats to hard-bottom areas. The banks could be targets for anchoring since the water depth is shallower over the banks. However, this is more likely a factor for smaller vessels, such as fishing boats, rather than service vessels.

Infrastructure and pipelines could be placed over topographic feature habitat, crushing the benthic community and damaging the structure of the habitat itself. While damage from a pipeline would likely affect a very limited area, the associated anchors and anchor chain/cables of a traditional pipelaying barge could devastate a wide swath of habitat along each side of the pipeline route.

Both explosive and nonexplosive structure-removal operations will disturb the seafloor and potentially affect nearby bank communities. Structure removal using explosives suspends sediments that will settle on nearby biotic communities. However, the heaviest sedimentation would not travel far and would not likely reach the upper portions of topographic features. The reef community can withstand some episodic sedimentation, and the organisms that colonize the lower parts of banks are adapted to turbid environments. Explosive structure removals create shock waves, which harm biota in the immediate vicinity. Organisms with swim bladders, such as fish, are most affected by blasts; most stationary benthic animals are remarkably resistant to these effects (O'Keeffe and Young, 1984).

Discharges of drilling cuttings and fluids can affect benthic organisms in the immediate vicinity of the activity. Cuttings can build layers up to 12 in (30 cm) thick near the well, smothering most sessile organisms. In addition, the cuttings may contain contaminants that are detrimental to the growth and development of organisms. The Topographic Features Stipulation requires shunting of drill cuttings and fluids to within 10 m (33 ft) of the bottom to protect the more sensitive organisms on the upper portions of the reef.

Produced-water discharges contain high amounts of dissolved solids and total organic carbon, and low dissolved oxygen. Other common components include heavy metals, elemental sulfur and sulfide, organic acids, treating chemicals, and emulsified and particulate crude oil constituents. The salinity of produced water can vary from 0 to 300 ppt. These products, if discharged directly on topographic feature habitats, would have harmful effects on the community. The Topographic Features Stipulation keeps discharges far enough away to protect the habitat.

CPA Proposed Action Analysis

The routine activities associated with a proposed action that would impact topographic feature communities in the CPA include anchoring, infrastructure and pipeline emplacement, infrastructure removal, drilling discharges, and produced-water discharges.

For a CPA proposed action, 395-564 new exploration/delineation and development wells and 28-40 new production structures are projected. The area is expected to have 24-36 structures removed, with 14-16 of them using explosives. About 130-2,075 km (80-1,289 mi) of new pipeline installation is projected. Approximately 119,000-241,000 service-vessel trips are expected to result from the CPA proposed action. Less than 2 percent of the CPA lease blocks contact topographic-feature protection zones. Therefore, only a small percentage of the projected new activity listed above is expected to be near topographic features.

The 181 South Area is 129 mi (207 km) from the nearest topographic feature in the CPA. Transiting service vessels would be the only likely connection between the two areas. Since the closest topographic feature habitats are deep, ≥56 m (184 ft) to their tops, it is unlikely that the 181 South Area would result in any effect unless a transiting vessel has a catastrophic accident near a bank.

Anchoring is potentially the most damaging impact to topographic features. The low percent of blocks having topographic features limits the likelihood that structures will be installed near a bank. Permit requests for activity in the vicinity of topographic features will receive close scrutiny to ensure protection based on the Topographic Features Stipulation. This greatly limits the likelihood of damage to the habitat. Most service vessels will travel to other locations, only occasionally transiting over a topographic feature. The Topographic Features Stipulation would prohibit activities from causing direct impacts to topographic feature communities by prohibiting activities on the habitat and limiting discharges in surrounding protection zones.

Very little new infrastructure is expected near topographic features. If the proposed lease stipulation is applied and followed, the benthic community should suffer no damaging impacts. None have been reported in the past. No bottom-disturbing activity is allowed within the No Activity Zones. Drill cuttings and fluids within the 1,000-m (3,281-ft), 1-mi (1.6-km), 3-mi (4.8-km), and 4-mi (6.4-km) zones must be shunted to within 10 m (33 ft) of the bottom. NTL 2004-G05 recommends that bottom-disturbing activities must be located at least 152 m (500 ft) from the No Activity Zones. Trenching is not required for pipelines in depths of over 60 m (200 ft); no CPA topographic features are found in depths shallower than this. Pipeline routes would avoid topographic feature habitat.

About 24-36 structure removals are projected for the CPA; 14-16 of these could be explosive removals. Any removals requested in a topographic feature area will be scrutinized very carefully. Options will be explored for using alternative methods during site clearance operations to minimize potential impact to hard-bottom communities. Techniques may require remote-sensing surveys to identify and recover debris. Topographic Features Stipulation requirements protecting the habitat would take precedence.

Produced-water discharges would be separated from sensitive, hard-bottom habitat the same as drill cuttings and fluids. Discharges are at the sea surface and would disperse and dilute before reaching the bank habitats. The Topographic Features Stipulation keeps impacts far enough away to protect the habitat from direct impacts.

WPA Proposed Action Analysis

The routine activities associated with a proposed action that would impact topographic feature communities in the WPA include anchoring, infrastructure and pipeline emplacement, infrastructure removal, drilling discharges, and produced-water discharges.

For a WPA proposed action, 197-287 new exploration/delineation and development wells and 28-41 new production structures are projected. The area is expected to have 20-31 structures removed, with 11-17 of them using explosives. About 130-760 km (80-472 mi) of new pipeline installation is projected. Approximately 94,000-155,000 service-vessel trips are expected to result from a WPA proposed action. Less than 4 percent of the WPA lease blocks contact topographic feature protection zones. Therefore, only a small percentage of the projected new activity listed above is expected to be near topographic features.

Anchoring is potentially the most damaging impact to topographic features. The low percent of blocks having topographic features limits the likelihood that structures will be installed near a bank. Permit requests for activity in the vicinity of topographic features will receive close scrutiny to ensure protection based on the Topographic Features Stipulation. This greatly limits the likelihood of damage to the habitat. Most service vessels will travel to other locations, only sometimes transiting over a topographic feature. The Topographic Features Stipulation would prohibit activities from causing direct impacts to topographic feature communities by prohibiting activities on the habitat and limiting discharges in surrounding protection zones.

Very little new infrastructure is expected near topographic features. If the proposed lease stipulation is applied and followed, the benthic community should suffer no damaging impacts. None have been reported in the past. No bottom-disturbing activity is allowed within the No Activity Zones. Drill cuttings and fluids within the 1,000-m (3,281-ft), 1-mi (1.6-km), 3-mi (4.8-km), and 4-mi (6.4-km) zones must be shunted to within 10 m (33 ft) of the bottom. NTL 2004-G05 recommends that bottom-disturbing activities must be located at least 152 m (500 ft) from the No Activity Zones. Trenching is not required for pipelines in depths of over 60 m (200 ft); only two WPA topographic features are found in depths shallower than this, at about 50 m (164 ft). Pipeline routes would avoid topographic feature habitat.

About 20-31 structure removals are projected for the WPA; 11-17 of these could be explosive removals. Any removals requested in a topographic feature area will be scrutinized very carefully. Options will be explored for using alternative methods during site clearance operations to minimize potential impact to hard-bottom communities. Techniques may require remote-sensing surveys to identify and recover debris. Topographic Features Stipulation requirements protecting the habitat would take precedence.

Produced-water discharges would be separated from sensitive, hard-bottom habitat the same as drill cuttings and fluids. Discharges are at the sea surface and would disperse and dilute before reaching the bank habitats. The Topographic Features Stipulation keeps impacts far enough away to protect the habitat from direct impacts.

Summary and Conclusion

The routine activities associated with a CPA or WPA proposed action that would impact topographic feature communities include anchoring, infrastructure and pipeline emplacement, infrastructure removal, drilling discharges, and produced-water discharges. Since the 181 South Area is 129 mi (207 km) from the nearest topographic feature, transiting service vessels would be the only likely connection between the two areas. Since the closest topographic feature habitats are deep, ≥56 m (184 ft) to their tops, it is unlikely that the 181 South Area would result in any effect unless a transiting vessel has a catastrophic accident near a bank. Adherence to the Topographic Features Stipulation makes damage to the ecosystem unlikely. Pipeline routes would avoid topographic feature habitat. Anchor damage and infrastructure emplacement is prohibited on a topographic feature habitat.

The MMS has reexamined the analysis for topographic features presented in the Multisale EIS, based on the additional information presented above. No significant new information was found that would alter the overall conclusion that impacts to topographic features from routine activities associated with a CPA or WPA proposed action would be minimal.

4.1.4.2.3. Impacts of Accidental Events

Background/Introduction

A detailed description of accidental impacts upon topographic features (banks) can be found in Chapter 4.4.4.1.2 of the Multisale EIS. Refer to **Chapters 2.2.1.3.1 and 2.3.1.3.1** for a complete description and discussion of the proposed Topographic Features Stipulations. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Accidental disturbances resulting from a proposed action in the CPA or WPA, including oil spills, blowouts, chemical spills, and vessel collisions have the potential to disrupt and alter the environmental, commercial, recreational, and aesthetic values of topographic features of both the CPA and WPA.

Oil spills potentially affecting topographic features and their biological communities could result from surface and seafloor spills. Both surface and subsurface spills could result in a steady discharge of oil over a long period of time. Surface oil spills may occur as a result of platform or tanker spills. The depth to which topographic features rise in the northern Gulf of Mexico (to within 15 m [49 ft] of the sea surface) should protect any of the reef plant and animal species they harbor from surface oil slicks. Oil from a surface spill can be driven into the water column; measurable amounts have been documented down to a 10-m (33-ft) depth, although modeling exercises have indicated such oil may reach a depth of 20 m (66 ft). At this depth, the oil is found at concentrations several orders of magnitude lower than the amount shown to have an effect on corals (Lange, 1985; McAuliffe et al., 1975 and 1981; Knap et al., 1985). Any dispersed oil that reaches the benthic dwellers would be expected to be at concentrations of less than 1 ppm. Such low oil concentrations would not be life threatening to larval or adult stages at that depth (Fucik et al., 1994). Because the crests of topographic features in the northern Gulf are found below 10 m (33 ft), no concentrated oil from a surface spill is expected to reach their sessile biota.

Seafloor spills could be caused by a tanker accident, pipeline rupture, or well blowout. However, a subsurface spill should rise to the surface, and any oil remaining at depth would probably be swept clear of the banks by currents moving around the banks (Rezak et al., 1983). Evidence from a recent experiment in the North Sea indicates that oil released during a deepwater blowout would quickly rise to the surface and form a slick (Johansen et al., 2001). Impacts from a deepwater oil spill would occur in the water column and at the surface where the oil would be mixed into the water and dispersed by wind waves. If some oil were to contact topographic features, the impacts would be primarily sublethal, with the disruption or impairment of a few elements at the local scale, but no interference to the general system performance would occur. The sublethal effects could be long lasting and affect the resilience of coral colonies to natural disturbances (e.g., elevated water temperature and diseases) (Jackson et al., 1989). It is anticipated that the potential recovery for such an event would occur within a period of 2 years (USDOC, NOAA, Office of Response and Restoration, 2007; Shigenaka, 2001; Rice et al., 1983). In the highly unlikely event that oil from a subsurface spill reached an area containing coral cover (e.g., Flower Garden Banks and Stetson Bank) in lethal concentrations, the impacted area would be small, but its recovery could take in excess of 10 years.

NTL 2004-G05 recommends that drilling would not occur within 152 m (500 ft) of a No Activity Zone, so blowouts would not occur in the immediate vicinity of the topographic features and associated biota. Therefore, hazardous concentrations of oil would be unlikely to reach the topographic features. Oil spills originating outside the No Activity Zones would rise to the surface and be dispersed to diluted concentrations in the water column prior to reaching topographic features (CSA, 1992b and 1994).

Common OCS-related chemicals spilled are methanol, ethylene glycol, zinc bromide, and ammonium chloride. Two chemicals could potentially impact the marine environment—zinc bromide and ammonium chloride (Boehm et al., 2001). Most other chemicals are either nontoxic or used in small quantities. Precipitation of zinc in marine waters would minimize the potential for impact. Ammonium chloride disassociates to temporarily elevate the levels of ammonia in the spill vicinity. Chemical dispersants can be used in the remediation of oil spills to promote mixing with the water and faster degradation. These would probably not be approved for use during the time of coral spawning (August-September).

Vessel collisions can result in spills of oils, fuels, and chemicals. Collision of a service vessel with a platform could result in spills from the vessel, the platform, or both. It could also cause a moored structure to drag anchors or break loose from anchors and subsequently impact a topographic feature. A collision could potentially result in the sinking of a vessel with direct physical impacts to a topographic feature. If a sunken vessel landed on or near a sensitive habitat, leaking fluids could contact the habitat directly. From 1996 to 2005, there were 129 OCS-related collisions, mostly with platforms or pipeline risers. Diesel fuel is the product most frequently spilled, while corrosion inhibitor, hydraulic fluid, lube oil, and methanol have also been released. Approximately 10 percent of vessel collisions with platforms in the OCS caused diesel spills. Minimal impacts result from a spill since diesel is light and will evaporate and biodegrade within a few days.

A search was conducted for new information published since completion of the Multisale EIS. Various Internet sources were examined to determine any recent information regarding topographic features. Sources investigated include USGS, NOAA, USEPA, and coastal universities. Other sites were found through general Internet searches.

Since Hurricanes Katrina and Rita in 2005, MMS has identified 154 spills of petroleum products of ≥1 bbl, totaling 17,077 bbl that were lost from platforms, rigs, and pipelines on the Federal OCS (USDOI, MMS, 2007e). There were no accounts of environmental consequences, including impacts to topographic features, resulting from OCS spills identified with Hurricanes Katrina and Rita.

CPA Proposed Action Analysis

The CPA contains 15 named topographic features that are protected from impacts by oil and gas activity by the MMS, all in waters less than 200 m (656 ft) deep. They represent a small fraction of the continental shelf area in the CPA.

The fact that the topographic 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 topographic features. As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. For a CPA proposed action including the 181 South Area, the probability of an oil spill ≥1,000 bbl occurring and passing over Sonnier Bank remains 3-5 percent and it is 2-3 percent for the Flower Garden Banks. The shallowest water depth over a bank in the CPA is about 18 m (60 ft) at Sonnier Bank. Depths to other banks are in excess of 30 m (100 ft). When surface spills are mixed into the water column, the oil is not expected to penetrate below a depth of about 10 m (33 ft). Based on OCS spill rates, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥500 bbl likely to occur as a result of a CPA proposed action.

Approximately 2-3 blowouts are projected to occur in the CPA during activities resulting from the proposed actions. With the application of the proposed stipulations, none of these blowouts should occur within 152 m (500 ft) of the No Activity Zones on protected banks. Furthermore, blowouts outside the No Activity Zones are unlikely to impact the biota of topographic features because oil will rapidly float to the surface.

Since collisions occur infrequently, the potential impacts to topographic features in the CPA are not expected to be significant. Chemical spills are also infrequent, of small quantity, and usually occur in surface waters. No significant impacts to topographic features in the CPA are expected.

The proposed Topographic Features Stipulation will assist in preventing most of the potential impacts from oil and gas operations including accidental oil spills, blowouts, vessel collisions, and chemical spills on the biota of topographic features.

WPA Proposed Action Analysis

The WPA contains 22 named topographic features that are protected from impacts by oil and gas activity by the MMS, all in water depths <200 m (656 ft). They represent a small fraction of the continental shelf area in the WPA.

The fact that the topographic 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 topographic features. For a WPA proposed action, the probability of an oil spill ≥1,000 bbl occurring and passing over Stetson Bank is 2-4 percent and it is 4-7 percent for the Flower Garden Banks. The East Flower Garden Bank rises to within 16 m (53 ft) of the sea surface, and the West Flower Garden Bank rises to within 18 m (59 ft). The next shallowest bank in the WPA is Stetson Bank at 20 m (65 ft). Depths to other banks are in excess of 30 m (100 ft). When surface spills are mixed into the water column, the oil is not expected to penetrate below a depth of about 10 m (33 ft).

Approximately 1-2 blowouts are projected to occur in the WPA during activities resulting from the proposed actions. With the application of the proposed stipulations, none of these blowouts should occur within 152 m (500 ft) of the No Activity Zones on protected banks. Furthermore, blowouts outside the No Activity Zones are unlikely to impact the biota of topographic features because oil will rapidly float to the surface.

Since collisions occur infrequently, the potential impacts to topographic features in the WPA are not expected to be significant. Chemical spills are also infrequent, of small quantity, and usually occur in surface waters. No significant impacts to topographic features in the WPA are expected.

The proposed Topographic Features Stipulation will assist in preventing most of the potential impacts from oil and gas operations including accidental oil spills, blowouts, vessel collisions, and chemical spills on the biota of topographic features.

Summary and Conclusion

Contact with accidentally spilled oil would cause lethal and sublethal effects in benthic organisms. 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 would keep subsurface sources of spills away from the immediate vicinity of 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 adult sessile biota, including coral colonies in the case of the Flower Garden Banks, and there would be limited incidences of mortality.

The MMS has reexamined the analysis for topographic features presented in the Multisale EIS, based on the additional information presented above. This new information supports the previous assessments. No significant new information was found that would alter the overall conclusion that impacts on topographic feature communities from accidental impacts associated with a CPA or WPA proposed action would be minimal.

4.1.4.2.4. Cumulative Impacts

Background/Introduction

A detailed description of cumulative impacts on topographic features can be found in Chapter 4.5.4.1.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

There are 37 topographic features (banks) protected by the MMS in the Gulf of Mexico. This cumulative analysis considers the effects of impact-producing factors related to the proposed actions plus those related to prior and future OCS lease sales, and to tanker and other shipping operations that may occur and adversely affect topographic feature communities. Non-OCS-related impacts, including natural disturbances, fishing, anchoring, treasure salving, and oil spills have the potential to alter topographic features. Specific OCS-related impact-producing factors considered in the analysis are infrastructure emplacement and removal, anchoring, drilling discharges, produced waters, oil spills, blowouts, chemical spills, and vessel collisions. Because the 181 South Area is 129 mi (207 km) from the nearest topographic feature, the only cumulative effect produced by its addition to a CPA proposed action is a small increase in the incremental impacts of vessel traffic.

It is assumed protective stipulations for the topographic features will be part of appropriate OCS leases and existing site/project-specific mitigations will be applied to OCS activities on these leases or supporting activities on these leases.

Non-OCS activities have a greater potential to affect the hard-bottom communities of the region than MMS-regulated activities. Natural disturbances such as hurricanes and extreme fluctuations of environmental conditions (e.g., nutrient pulses, low dissolved oxygen levels, seawater temperature minima, and seasonal algal blooms) can affect topographic feature communities. Hurricanes can produce waves that reach the crest of the topographic features to destroy and remove organisms. The height of topographic features above the surrounding soft bottoms elevates most of the reef community above the common effects of bottom currents that resuspend soft sediments. Organisms on the lower part of the reef are adapted to high turbidity.

Recreational boating and fishing may severely impact topographic feature communities. Anchor damage by fishing boats appears to be a serious problem at Sonnier Bank (Robbart et al., in preparation; Rooker et al., in preparation). Bottom longlining could potentially result in cumulative impacts to topographic feature communities. If contact did occur, impacts from bottom longlines would be minimal. Ships anchoring near major shipping fairways, on occasion, may impact sensitive areas located near these fairways.

Treasure salvage operations have targeted one bank for over 20 years, causing extensive damage to the reef community. Bright Bank, on the shelf-edge about 160 km (100 mi) south of Cameron, Louisiana, has numerous excavation sites reaching 1-4 m (3-12 ft) into the reef and up to 4 m (12 ft) across. Large coral heads appear to have been tumbled down the slope into deeper water (Hickerson, personal communication, 2007).

Oil and chemical spills from non-OCS-related impacts could result from vessel collisions and other accidents. While an unlikely event (<1/yr), import tanker accidents could produce the largest offshore spills. These oil and chemical spills will have the same effect as described below for OCS-related impacts.

Oil and gas activities produce cumulative effects on the offshore environment. The Topographic Features Stipulation prevents direct impacts to topographic feature communities. The placement of structures on the seafloor crushes organisms and can cause scouring of the surficial sediments (Caillouet et al., 1981). The effect of pipeline-laying activities on the biota of topographic feature communities would be restricted to the temporary resuspension of sediments resulting in sublethal effects over small areas.

Explosive and nonexplosive structure-removal operations disturb the seafloor. Structure removal using explosives (the most common removal method) can suspend sediments, which settle much in the same manner as discussed below for muds and cuttings discharges. Shock waves in the seafloor are attenuated within 100 m (328 ft) from the structure (Baxter et al., 1982). Resuspended sediments would impact an area within a radius of approximately 1,000 m (3,281 ft). The explosive removal of structures is expected to have minimal effects on topographic feature communities.

Anchor damage from support boats and ships, floating drilling units, and pipeline-laying vessels are considered the greatest potential OCS-related threat to topographic feature areas. Anchoring can destroy a wide swath of habitat when a vessel drags or swings at anchor, causing the chain to drag across the seafloor. The biological stipulations limit the proximity of new activities to topographic features. The misplacement of anchors could severely impact hard-bottom substrate, which has recovery rates (which are not well documented) estimated at 5-20 years depending on the severity. These impacts are unlikely due to the 500 ft (152 m) buffer area around topographic features.

Routine discharges of drilling muds and cuttings by oil and gas operations could smother organisms or produce less obvious sublethal toxic effects. Lease stipulations and site-specific mitigations would prevent drilling discharges directly over topographic feature habitat. Most drilling discharges in the vicinity of topographic features are shunted to the seafloor. Drilling discharges should reach undetectable concentrations in the water column within 1,000 m (3,281 ft) of the discharge point, thus limiting potential toxic effects to benthic organisms. Effects would diminish rapidly with increasing distance from the discharge area. The levels of contaminants in the water column and sediments are expected to be well below the new USEPA discharge regulations and permits (Chapter 4.1.3.4 of the Multisale EIS). The deposition of drilling muds and cuttings in topographic feature areas is not expected to greatly impact the biota or the habitat. The impact from muds and cuttings discharged as a result of the cumulative scenario would be temporary, primarily sublethal in nature, and the effects would be limited to small areas.

Produced waters would be discharged at the surface; the depth of the topographic features, currents, and lateral offset of discharges would render the wastes harmless to the habitat. Adverse impacts of cumulative activities would therefore be temporary, primarily sublethal in nature, and the effects would be limited to small areas. Predicted recovery to pre-impact conditions from these sublethal impacts would take place within 5 years.

Surface spills of oil can be mixed into the water column by wave turbulence. Measurable amounts have been documented down to a 10-m (33-ft) depth, and models have indicated such oil may reach a depth of 20 m (66 ft). Concentrations at these depths would be several orders of magnitude lower than the amount required to effect marine organisms (Lange, 1985; McAuliffe et al., 1975 and 1981). Since topographic features reside below 20-m (66-ft) water depth, surface spills would not impact the biota.

Subsurface pipeline oil spills are not expected to cause damage to topographic feature biota because the oil would rise rapidly to the sea surface (Johansen et al., 2001). There is little probability that a subsurface oil spill will impact topographic features since the lease stipulations prevent the installation of pipelines in their immediate vicinity. The adverse impacts from subsurface oil spills on topographic features would be minor in scope, primarily sublethal in nature, and the effects would be contained within a small area. Recovery to pre-impact conditions from these sublethal impacts would take place within 5-10 years.

Subsurface blowouts can resuspend sediments and release hydrocarbons into the water column near topographic feature communities. The continued implementation of lease stipulations and site-specific mitigations should prevent blowouts from occurring directly on topographic features. A severe subsurface blowout within 400 m (1,312 ft) of a topographic feature could result in the smothering of the biota due to sedimentation. Since the topographic feature biota at the deeper levels is adapted to turbid conditions, most impacts would probably be sublethal with recovery taking place within 5 years.

Common OCS-related chemicals spilled are methanol, ethylene glycol, zinc bromide, and ammonium chloride. The last two could potentially impact the marine environment; most other chemicals are either nontoxic or used in small quantities (Boehm et al., 2001). The effects of ammonium chloride would be rapidly diluted, and zinc quickly precipitates out of solution. Chemical dispersants used on the sea surface would be thoroughly diluted before reaching the topographic feature community.

Vessel collisions can result in spills of oils, fuels, and chemicals. If a sunken vessel landed on or near a sensitive habitat, leaking fluids could contact the habitat directly. Diesel fuel is the product most frequently spilled, while corrosion inhibitor, hydraulic fluid, lube oil, and methanol have also been released. Minimal impacts result from a spill since diesel is light and will evaporate and biodegrade within a few days. In the unlikely event a freighter, tanker, or other ocean-going vessel related to OCS Program activities sank and proceeded to collide with a topographic feature or associated habitat, releasing its cargo, recovery capabilities from such a catastrophic scenario are unknown at this time.

Should the Topographic Features Stipulation not be implemented, OCS activities could have the potential to destroy part of the biological communities. The most potentially damaging of these are the impacts associated with physical damages that may result from anchors, structure emplacement, and other bottom-disturbing operations. The OCS Program, with the benefit of protective lease stipulations and site-specific mitigations, would have little adverse impact on topographic feature communities and habitat.

Summary and Conclusion

Non-OCS activities in the vicinity of the hard-bottom communities include natural disturbances, fishing, anchoring, treasure salving, and oil spills. These activities could cause severe damage that could threaten the survival of topographic feature communities. Ships using fairways in the vicinity of topographic features may anchor in the general area of topographic features on occasion, and numerous fishermen take advantage of the relatively shallow and easily accessible resources of regional topographic features. These activities could lead to severe and permanent physical damage. During severe storms, such as hurricanes, large waves can reach the crest of some topographic features with enough force to damage the reef community.

Impact-producing factors resulting from activities of OCS oil and gas operations include infrastructure emplacement and removal, anchoring, drilling discharges, produced waters, oil spills, blowouts, chemical spills, and vessel collisions. Long-term OCS activities are not expected to adversely impact the topographic feature environment if these impact-producing factors are restrained by the continued implementation of protective lease stipulations and site-specific mitigations. The inclusion of the Topographic Features Stipulation would preclude the occurrence of physical damage, the most potentially damaging of these activities. The impacts to the topographic features are judged to be infrequent because of the small number of operations in the vicinity of topographic features. The impact to the topographic feature resource as a whole is expected to be slight because of the projected lack of community-wide impacts. Activities associated with the 181 South Area would produce a small incremental increase in impacts due to navigational traffic.

Potential impact from oil spills ≥1,000 bbl would be restricted because of the depth of the features (>20 m or 66 ft), because subsea pipeline spills are expected to rise rapidly, and because of the low prospect of pipelines being routed immediately adjacent to topographic features. The frequency of impacts to topographic features should be rare and the severity slight. Impacts from accidents involving the misplacement of anchors on topographic features could be severe in small areas (those actually crushed or subjected to abrasions).

The incremental contribution of a CPA or 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 discharges, structure removals, and oil spills. 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.

New information published since completion of the Multisale EIS is discussed above in the description of the affected environment and incorporated into the impact analyses. No new OCS or non-OCS activities were found. New information supports the previous assessments contained in the Multisale EIS, which is incorporated by reference, and does not necessitate a reanalysis of the impacts for the proposed actions. The 181 South Area is about 129 mi (207 km) from the nearest topographic feature and is expected to result in a small increase in the incremental impacts of vessel traffic. The analysis and potential impacts detailed in the Multisale EIS remains valid for this SEIS.

4.1.5. Continental Slope and Deepwater Resources

The MMS has reexamined the analysis for continental slope and deepwater resources presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for continental slope and deepwater resources presented in the Multisale EIS. The 181 South Area is not expected to have any chemosynthetic or hard-bottom, nonchemosynthetic communities (such as deepwater corals) that would be exposed to any kind of impacts from routine activities or accidental events associated with a proposed action.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Chemosynthetic and nonchemosynthetic communities are susceptible to physical impacts from structure placement, anchoring, and pipeline installation associated with a CPA or WPA proposed action; however, the guidance provided in NTL 2000-G20 greatly reduce the risk of these physical impacts by requiring avoidance of potential chemosynthetic communities and by consequence avoidance of other hard-bottom communities. Even in situations where the substantial burial of typical benthic infaunal communities occurred, recolonization from 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 a CPA or WPA proposed action are expected to cause little damage to the ecological function or biological productivity of the widespread, low-density chemosynthetic communities and the widespread, typical, deep-sea benthic communities. The most serious, cumulative, impact-producing factor threatening chemosynthetic and nonchemosynthetic communities is physical disturbance of the seafloor by OCS activities, which could destroy the organisms of these communities. The incremental contribution of a proposed action to the cumulative impacts is expected to be slight, and adverse impacts will be limited but not completely eliminated by adherence to NTL 2000-G20.

4.1.5.1. Description of the Affected Environment

4.1.5.1.1. Chemosynthetic Communities

A detailed description of the biology, life history, and distribution of chemosynthetic, deepwater benthic communities can be found in Chapter 3.2.2.2.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

Chemosynthetic communities are remarkable in that they utilize a carbon source independent of photosynthesis and the sun-dependent photosynthetic food chain that supports most all other life on earth. Although the process of chemosynthesis is entirely microbial, chemosynthetic bacteria and their production can support thriving assemblages of higher organisms through symbiosis. The chemosynthetic communities of the Gulf of Mexico have been studied extensively over the past 21 years, and communities first discovered on the upper slope of the Gulf of Mexico are likely the best understood seep communities in the world. The discovery history of these remarkable animals has all occurred within only the last 30 years.

There is a clear relationship between known hydrocarbon discoveries at great depth in the Gulf slope and chemosynthetic communities, hydrocarbon seepage, and authigenic minerals including carbonates at the seafloor. While the hydrocarbon reservoirs are broad areas several kilometers (miles) beneath the

Gulf, chemosynthetic communities occur in isolated areas with thin veneers of sediment only a few meters (feet) thick. What was initially thought to be relatively rare occurrences of chemosynthetic communities is now known to be far more common and regularly associated with primary geophysical signatures of the seabed, including faulting with conduits for hydrocarbons to the surface from deeper depths and precipitation of carbonate deposits on the seafloor. Anomalies of seismic survey acoustic amplitudes are one major feature related to most known chemosynthetic communities, and these kinds of features are now relatively well mapped throughout the entire northern Gulf of Mexico. The total number of features on the northern Gulf slope that have probable associated communities now number in the thousands.

Additional research was conducted to investigate recently available information since completion of the Multisale EIS. A search of Internet information sources (including scientific journals) as well as interviews with personnel from academic institutions and governmental resource agencies was conducted to determine the availability of new information. In addition, there is an ongoing MMS/National Oceanic and Atmospheric Administration Office of Ocean Exploration (NOAA-OE) co-sponsored research project, *Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico*, specifically targeting chemosynthetic communities in the deep Gulf of Mexico. This study was referenced in the Multisale EIS (USDOI, MMS, 2007b). Some new chemosynthetic communities were discovered in 2006 and 2007; however, they were located using the same criteria used during the biological review process for oil and gas operation plans or pipeline applications to determine the proximity of areas with potential chemosynthetic communities.

Chemosynthetic communities are not expected anywhere in the 181 South Area. There are no known surface amplitude anomalies and this deep area is not underlain by salt structures that create conditions conducive to faulting and hydrocarbon flows similar to other areas of the Gulf.

4.1.5.1.2. Nonchemosynthetic Communities

The description of the biology, life history, and distribution of nonchemosynthetic, deepwater benthic communities can be found in Chapter 3.2.2.2.2 of the Final Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

A proposed lease sale area encompasses a vast range of habitats and water depths. The shallowest lease area encompasses the entirety of the upper slope, regardless of the depth criteria used to define the continental slope. The deepest portions extend nearly into the deepest part of the Gulf of Mexico at approximately 3,500 m (11,485 ft) south of the Sigsbee Escarpment in the Central Gulf. The additional 181 South Area is also very deep, ranging from 2,700 to 3,200 m (8,900 to 10,500 ft).

Other types of communities in the deep Gulf include the full spectrum of living organisms also found on the continental shelf or other areas of the marine environment. Major groups include bacteria and other microbenthos, meiofauna (0.063-0.3 mm or 0.002-0.012 in), macrofauna (>0.3 mm or >0.012 in), and megafauna (larger organisms such as crabs, sea pens, crinoids, and demersal fish). All of these groups are represented throughout the entire Gulf of Mexico—from the continental shelf to the deepest abyss at about 3,850 m (12,630 ft). Recent study results in Rowe (2002) have indicated some unique areas near the Mississippi River delta with substantially higher community biomass and carbon flux.

Deepwater coral habitats and other potential hard-bottom communities not associated with chemosynthetic communities appear to be relatively rare. These unique communities are distinctive and similar in nature to protected pinnacles and topographic features on the continental shelf. Interest in deepwater corals has increased rapidly in the last decade as more coral systems are discovered worldwide and their importance in providing habitat for diverse communities is realized.

Additional research was conducted to investigate recently available information since completion of the Multisale EIS. A search of Internet information sources (including scientific journals) as well as interviews with personnel from academic institutions and governmental resource agencies was conducted to determine the availability of new information. The MMS recently published two studies on hard-bottom communities with an emphasis on *Lophelia* coral. The following are summaries of the results of these two studies, which will be used to develop additional studies of hard-bottom habitats in the deep Gulf of Mexico and will also enhance the ability of MMS to protect sensitive, deepwater biological features.

The report, *Characterization of Northern Gulf of Mexico Deepwater Hard-Bottom Communities with Emphasis on Lophelia Coral* (CSA, 2007), presents the results of a study of 10 sites on the northern Gulf of Mexico continental slope consisting of hard-bottom areas that generally include dense assemblages of the coral *Lophelia pertusa*. Study elements include geological characterization; biological characterization, imaging, and sampling; water chemistry; and physical oceanography including short-term and long-term current meter deployments. This was the first comprehensive study of the distribution of *Lophelia pertusa* and its biology and ecology in the Gulf of Mexico. Results suggest that *L. pertusa* plays a significant role in the ecology of hard-bottom habitats on the upper slope.

The report, *Seafloor Characteristics and Distribution Patterns of Lophelia pertusa and Other Sessile Megafauna at Two Upper-Slope Sites in the Northeastern Gulf of Mexico* (Schroeder 2007), presents results of a study funded to document the seafloor characteristics and the distribution patterns of the deepwater coral *Lophelia pertusa* and other sessile megafauna at two sites in the Gulf of Mexico. The two sites, Viosca Knoll 826 (VK 826) and Viosca Knoll 862-906 (VK 862-906) are located on the upper DeSoto Slope subprovince. One of the sites, VK 862-906, is in close proximity to the site reported from the 1950's field sampling by Moore and Bullis (1960). The dominant taxa at both the VK862 and VK906 sites, in terms of numbers and biomass, are anemones. The largest megafauna observed were the antipatharians at VK 862-906, with individual colonies estimated to be between 2.1 and 2.4 m (7 and 8 ft) tall. There appears to be at least four species of antipatharians and, collectively, they are the second most abundant megafauna taxa at both sites. The dominant megafauna taxon at the VK 862 site is *L. pertusa*, which has successfully developed extensive assemblage complexes, comprised of large colony aggregations/thickets, at numerous locations. The VK 826 site has the most extensive development of *L. pertusa* found in the Gulf of Mexico to date.

The report also discusses evidence of manmade disturbances. Furrows apparently produced when wire anchor cables, deployed in conjunction with oil and gas drilling operations conducted in this region, struck the bottom one or more times. When megafauna were present, moderate to severe damage to individual colonies or colony aggregations often resulted. However, there was no indication that extensive areawide destruction has occurred, although these features are present throughout the main knoll survey area.

In addition, there is an ongoing MMS/NOAA-OE co-sponsored research project, *Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico*, specifically targeting deepwater coral communities in the deep Gulf of Mexico. This study was referenced in the Multisale EIS (USDOI, MMS, 2007b). Some new, deepwater coral communities were discovered in 2006 and 2007; however, they were located using the same criteria used during the biological review process for oil and gas operation plans or pipeline applications to determine the proximity of areas with potential chemosynthetic communities that also incorporates hard bottom and potential deepwater coral habitats.

The 181 South Area is not expected to have any unusual biological communities that differ from typical, mud-bottom fauna that would normally occur at those depths (2,700-3,200 m or 8,900-10,500 ft). No exposed hard-bottom areas that could support coral or other attached communities are known to occur in the area. Basic descriptions of typical, soft-bottom fauna (i.e., bacteria, meiofauna, macrofauna, and megafauna) are addressed in the Multisale EIS. A great number of publications have derived from the two major MMS-funded deep Gulf studies—Rowe (2002) and Gallaway et al. (1988)—from which the majority of this summary information is derived. These two studies are incorporated by reference for extensive background information on deepwater Gulf of Mexico habitat and biological communities.

4.1.5.2. Impacts of Routine Events

4.1.5.2.1. Chemosynthetic Communities

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA or WPA proposed action on chemosynthetic communities is presented in Chapters 4.2.1.1.4.2.1 and 4.2.2.1.4.2.1 of the Multisale EIS, respectively.

Chemosynthetic communities are susceptible to physical impacts from drilling discharges, structure placement (including templates or subsea completions), anchoring, or pipeline installation. In deep water, discharges of drilling fluids and cuttings at the surface are spread across broader areas of the seafloor and are, in general, distributed in thinner accumulations than in shallower areas on the continental shelf. The physical disturbances by structures themselves are typically limited to anchors for holding floating drilling or production facilities over the well sites. Anchors from support boats and ships (or any buoys set out to moor vessels), floating drilling units, barges used for construction of platform structures, pipelaying vessels, and pipeline repair vessels also cause disturbances to small areas of the seafloor. Normal pipelaying activities in deepwater areas could impact areas of chemosynthetic organisms if they were crossed by the pipeline (pipeline burial is not required at depths where chemosynthetic communities are found).

The guidance provided in NTL 2000-G20 greatly reduce the risk of these physical impacts by requiring avoidance of potential chemosynthetic communities identified on required geophysical survey records or by requiring photodocumentation to establish the absence of chemosynthetic communities prior to approval of the structure or pipeline emplacement.

CPA Proposed Action Analysis

Chemosynthetic communities could be found in the deeper water areas of the CPA (i.e., Subareas C400-800, C800-1600, C1600-2400, and C>2400 m). The levels of projected activity in deep water as a result of a proposed action in the CPA are shown in **Table 3-2**. A range of 103-161 oil and gas production structures ranging from small subsea developments to large developments involving floating, fixed, or subsea structures are estimated to be installed during the 40-year analysis period in the deepwater portions of the CPA as a result of a proposed action.

NTL 2000-G20 recommends the search for and avoidance of dense chemosynthetic communities (such as Bush Hill-type communities) or areas that have a high potential for supporting these community types, as interpreted from geophysical records. The NTL is exercised on all applicable leases and is not an optional protective measure. The requirements and discussion of the effectiveness of the NTL is presented in Chapter 4.2.2.1.4.2.1 of the Multisale EIS.

The 181 South Area is part of the CPA proposed action, but it is not expected to have any chemosynthetic communities that would be exposed to any kind of routine impacts. If new geophysical survey information did indicate the potential presence of chemosynthetic communities, the same biological review process and use of NTL 2000-G20 would apply, resulting in a greatly reduced probability of any impacts occurring.

WPA Proposed Action Analysis

Chemosynthetic communities could be found in the deeper water areas of the WPA (i.e., Subareas W400-800, W800-1600, W1600-2400, and W>2400 m). The levels of projected activity in deep water as a result of a proposed action in the WPA are shown in **Table 3-3**. A range of 60-91 oil and gas production structures ranging from small subsea developments to large developments involving floating, fixed, or subsea structures are estimated to be installed during the 40-year analysis period in the deepwater portions of the WPA as a result of a proposed action.

NTL 2000-G20 recommends the search for and avoidance of dense chemosynthetic communities (such as Bush Hill-type communities) or areas that have a high potential for supporting these community types, as interpreted from geophysical records. The NTL is exercised on all applicable leases and is not an optional protective measure. The requirements and discussion of the effectiveness of the NTL is presented in Chapter 4.2.1.1.4.2.1 of the Multisale EIS.

Summary and Conclusion

Chemosynthetic communities are susceptible to physical impacts from structure placement (including templates or subsea completions), anchoring, and pipeline installation. The guidance provided in NTL 2000-G20 greatly reduce the risk of these physical impacts by requiring the avoidance of potential chemosynthetic communities.

The MMS has reexamined the analysis for impacts to chemosynthetic communities presented in the Multisale EIS, based on the additional information presented above. No significant new information was found that would alter the overall conclusion that impacts on chemosynthetic communities from routine activities associated with a CPA or WPA proposed action would be minimal to none. The 181 South Area is not expected to have any chemosynthetic communities that would be exposed to any kind of routine impacts.

4.1.5.2.2. Nonchemosynthetic Communities

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA or WPA proposed action on nonchemosynthetic communities is presented in Chapters 4.2.1.1.4.2.2 and 4.2.2.1.4.2.2 of the Multisale EIS, respectively. Similar to chemosynthetic communities, benthic communities other than chemosynthetic organisms could be impacted by physical impacts from drilling discharges, structure placement (including templates or subsea completions), anchoring, or pipeline installation.

Both widespread soft-bottom and rare hard-bottom, nonchemosynthetic deepwater benthic communities are susceptible to physical impacts from drilling discharges, structure placement (including templates or subsea completions), anchoring, or pipeline installation. In deep water, discharges of drilling fluids and cuttings at the surface are spread across broader areas of the seafloor and are, in general, distributed in thinner accumulations than in shallower areas on the continental shelf. Carbonate outcrops and deepwater coral communities not associated with chemosynthetic communities are considered to be most at risk from oil and gas operations.

The physical disturbances by structures themselves are typically limited to anchors for holding floating drilling or production facilities over the well sites. Anchoring will not necessarily directly destroy small infaunal organisms living within the sediment; the bottom disturbance would most likely change the environment to such an extent that the majority of the directly impacted infauna community would not survive (e.g., burial or relocation to sediment layers without sufficient oxygen) but adjacent populations of all size classes of organisms would quickly repopulate the modified sediment. In addition, increased surface roughness (rugosity) resulting from anchor or related disturbance of mud bottom will positively impact the habitat value for many infaunal and epifaunal groups as a result of increased habitat complexity. In cases of carbonate outcrops or reefs with attached epifauna or coral, the impacted area of disturbance may be small in absolute terms, but it could be large in relation to the area inhabited by fragile hard corals or other organisms that rely on exposed hard substrate. Anchors from support boats and ships (or any buoys set out to moor vessels), floating drilling units, barges used for the construction of platform structures, pipelaying vessels, and pipeline repair vessels could also cause severe disturbances to small areas of the seafloor.

Normal pipelaying activities in deepwater areas could impact areas of hard-bottom nonchemosynthetic organisms if they were crossed by the pipeline (pipeline burial is not required at depths where chemosynthetic communities are found). Impacts of pipeline contact on soft bottom would be minimal.

CPA Proposed Action Analysis

The routine activities associated with a CPA proposed action that would impact nonchemosynthetic benthic communities would come from activities associated with drilling discharges, structure placement (including templates or subsea completions), anchoring, or pipeline installation. For a CPA proposed action, 114-174 oil and gas structures ranging from small subsea developments to large developments involving floating, fixed, or subsea structures are estimated to be installed during the 40-year analysis period in Subareas C200-400 C400-800, C800-1600, C1600-2400, and C>2400 m (**Table 3-2**). Drilling muds and cuttings discharged at the seafloor or from the surface will have some limited impact to soft-bottom communities at or below the sediment/water interface. The surface discharge of muds and cuttings in deeper water would reduce or eliminate the impact of smothering the benthic communities on the bottom due to increased dispersal. Even in situations where the substantial burial of typical benthic infaunal communities occurred, recolonization from populations from neighboring soft-bottom substrate would be expected over a relatively short period of time for all size ranges of organisms. An additional analysis of muds and cuttings discharge impacts appears in Chapter 4.1.1.4.1 of the Multisale EIS.

Physical disturbance or destruction of a limited area of benthos or to a limited number of megafauna organisms, such as brittle stars, sea pens, or crabs, would not result in a major impact to the deepwater benthos ecosystem as a whole. Under the current review procedures for chemosynthetic communities, carbonate outcrops are targeted as one possible indication (surface amplitude anomaly on 3D seismic survey data) that chemosynthetic seep communities could be nearby. Unique communities that may be associated with any carbonate outcrops or other topographical features can be identified via this review, along with the chemosynthetic communities. Typically, all areas suspected of being hard bottom are avoided as geological hazards for any well sites. Any proposed activity in water depths >400 m (1,312 ft) would automatically trigger the NTL 2000-G20 evaluation described above.

The impacts of pipeline contact on soft bottom would be minimal because pipeline burial is not required in water depths <61 m (200 ft). Hard-bottom areas would be avoided for the same reasons described above.

There is no evidence of any exposed hard substrate in the 181 South Area that could support significant nonchemosynthetic communities and be exposed to any kind of routine impacts. If new geophysical survey information did indicate the potential presence of hard-bottom areas (that could support deepwater corals or other significant communities), the same biological review process and use of NTL 2000-G20 would apply, resulting in a greatly reduced probability of any impacts occurring.

WPA Proposed Action Analysis

The routine activities associated with a WPA proposed action that would impact nonchemosynthetic benthic communities would come from activities associated with drilling discharges, structure placement (including templates or subsea completions), anchoring, or pipeline installation. For a WPA proposed action, 65-97 oil and gas structures ranging from small subsea developments to large developments involving floating, fixed, or subsea structures are estimated to be installed during the 40-year analysis period in Subareas W200-400, W400-800, W800-1600, W1600-2400, and W>2400 m (**Table 3-3**). Drilling muds and cuttings discharged at the seafloor or from the surface will have some limited impact to soft-bottom communities at or below the sediment/water interface. The surface discharge of muds and cuttings in deeper water would reduce or eliminate the impact of smothering the benthic communities on the bottom due to increased dispersal. Even in situations where the substantial burial of typical benthic infaunal communities occurred, recolonization from populations from neighboring soft-bottom substrate would be expected over a relatively short period of time for all size ranges of organisms. An additional analysis of muds and cuttings discharge impacts appears in Chapter 4.1.1.4.1 of the Multisale EIS.

Physical disturbance or destruction of a limited area of benthos or to a limited number of megafauna organisms, such as brittle stars, sea pens, or crabs, would not result in a major impact to the deepwater benthos ecosystem as a whole. Under the current review procedures for chemosynthetic communities, carbonate outcrops are targeted as one possible indication (surface amplitude anomaly on 3D seismic survey data) that chemosynthetic seep communities could be nearby. Unique communities that may be associated with any carbonate outcrops or other topographical features can be identified via this review, along with the chemosynthetic communities. Typically, all areas suspected of being hard bottom are avoided as geological hazards for any well sites. Any proposed activity in water depth >400 m (1,312 ft) would automatically trigger the NTL 2000-G20 evaluation described above.

Impacts of pipeline contact on soft bottom would be minimal because pipeline burial is not required in water depths <61 m (200 ft). Hard-bottom areas would be avoided for the same reasons described above.

Summary and Conclusion

Some impact to soft-bottom benthic communities from drilling and production activities would occur as a result of physical impact from drilling discharges, structure placement (including templates or subsea completions), anchoring, and installation of pipelines regardless of their locations. Even in situations where the substantial burial of typical benthic infaunal communities occurred, recolonization from populations from widespread neighboring soft-bottom substrate would be expected over a relatively short period of time for all size ranges of organisms.

Impacts to other hard-bottom communities are expected to be avoided as a consequence of the application of the existing NTL 2000-G20 for chemosynthetic communities. The same geophysical conditions associated with the potential presence of chemosynthetic communities also results in hard carbonate substrate that is generally avoided.

The MMS has reexamined the analysis for impacts to chemosynthetic communities presented in the Multisale EIS, based on the additional information presented above. No significant new information was found that would alter the overall conclusion that impacts on chemosynthetic communities from routine activities associated with a CPA or WPA proposed action would be minimal to none. The 181 South Area is not expected to have any sensitive exposed hard bottom that would be exposed to any kind of routine impacts.

4.1.5.3. Impacts of Accidental Events

4.1.5.3.1. Chemosynthetic Communities

Background/Introduction

A detailed description of accidental impacts upon chemosynthetic, deepwater benthic communities can be found in Chapter 4.4.4.2.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Accidental events that could impact chemosynthetic communities are limited primarily to blowouts. A blowout at the seafloor could create a crater and could resuspend and disburse large quantities of bottom sediments within a 300-m (984-ft) radius from the blowout site, burying organisms located within that distance to some degree. The application of avoidance criteria for chemosynthetic communities recommended by NTL 2000-G20 should preclude the impact of a blowout to a distance of at least 457 m (1,500 ft).

Impacts to chemosynthetic communities from any oil released would be a remote possibility. The release of hydrocarbons associated with a blowout should not present a possibility for impact to chemosynthetic communities located a minimum of 457 m (1,500 ft) from well sites (as recommended by NTL 2000-G20). All known reserves in the Gulf of Mexico to date have specific gravity characteristics that would preclude oil from sinking immediately after release at a blowout site. The potential for weathered components from a surface slick reaching a chemosynthetic community in any measurable volume would be very small.

Oil and chemical spills are not considered to be a potential source of measurable impacts on chemosynthetic communities because of the water depths at which these communities are located.

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. Tube-worm communities may be the most sensitive of all communities because of the combined requirements of hard substrate and active hydrocarbon seepage. Mature tube-worm bushes have been found to be several hundred years old. There is evidence that substantial impacts on these communities would permanently prevent reestablishment, particularly if hard substrate required for recolonization was buried.

CPA Proposed Action Analysis

For water depths >400 m (1,312 ft), 0-2 blowouts are estimated in the CPA. The application of avoidance criteria for chemosynthetic communities recommended by NTL 2000-G20 should preclude any impact from a blowout at a minimum distance of 457 m (1,500 ft), which is beyond the distance of expected benthic disturbance. Resuspended bottom sediments transported by near-bottom currents could reach chemosynthetic communities located beyond 457 m (1,499 ft) and potentially impact them by burial or smothering.

The risk of various sizes of oil spills occurring in the CPA is presented in **Tables 3-6 and 3-7**. The probability of oil in any measurable concentration reaching depths of 400 m (1,312 ft) or greater is very small.

The 181 South Area is part of the proposed CPA sale area but it is not expected to have any chemosynthetic communities that would be exposed to any kind of accidental impacts. If new geophysical survey information did indicate the potential presence of chemosynthetic communities, the same biological review process and use of NTL 2000-G20 would apply, resulting a in greatly reduced probability of any impacts occurring.

WPA Proposed Action Analysis

For water depths >400 m (1,312 ft), 0-1 blowouts are estimated in the WPA. The application of avoidance criteria for chemosynthetic communities recommended by NTL 2000-G20 should preclude any impact from a blowout at a minimum distance of 457 m (1,500 ft), which is beyond the distance of expected benthic disturbance. Resuspended bottom sediments transported by near-bottom currents could reach chemosynthetic communities located beyond 457 m (1,499 ft) and potentially impact them by burial or smothering.

The risk of various sizes of oil spills occurring in the WPA is presented in **Tables 3-6 and 3-7**. The probability of oil in any measurable concentration reaching depths of 400 m (1,312 ft) or greater is very small.

Summary and Conclusion

Chemosynthetic communities could be susceptible to physical impacts from a blowout depending on bottom-current conditions. The guidance provided in NTL 2000-G20 greatly reduce the risk of these physical impacts by requiring avoidance of potential chemosynthetic communities identified on required geophysical survey records or by requiring photodocumentation to establish the absence of chemosynthetic communities prior to approval of the structure emplacement.

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). There is evidence that substantial impacts on these communities would permanently prevent reestablishment, particularly if hard substrate required for recolonization was buried by resuspended sediments from a blowout.

Potential accidental impacts from a CPA or WPA proposed action are expected to cause little damage to the ecological function or biological productivity of the widespread, low-density chemosynthetic communities. The rarer, widely scattered, high-density, Bush Hill-type chemosynthetic communities located at more than 1,500 ft (457 m) away from a blowout could experience minor impacts from resuspended sediments.

The MMS has reexamined the analysis for impacts to chemosynthetic communities presented in the Multisale EIS, based on the additional information presented above. No significant new information was found that would alter the overall conclusion that impacts on chemosynthetic communities from routine activities associated with a CPA or WPA proposed action would be minimal to none. The 181 South Area is not expected to have any chemosynthetic communities that would be exposed to any kind of accidental impacts.

4.1.5.3.2. Nonchemosynthetic Communities

Background/Introduction

A detailed description of accidental impacts upon nonchemosynthetic, deepwater benthic communities can be found in Chapter 4.4.4.2.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

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, thus destroying 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, such as brittle stars, sea pens, or 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.

Oil and chemical spills are not considered to be a potential source of measurable impacts to nonchemosynthetic, deepwater benthic communities because of the water depths at which these communities are located. Oil spills at the surface would tend not to sink. The risk for weathering components from a surface slick reaching the benthos in any measurable concentrations would be very small.

Deepwater coral habitats and other potential hard-bottom communities not associated with chemosynthetic communities appear to be relatively rare. One discovery of a dense deepwater coral habitat was recently made as a part of the MMS study, *Investigations of Chemosynthetic Communities on the Lower Continental Slope of the Gulf of Mexico* (Brook et al., in preparation) at a depth of 1,400 m (4,593 ft); however, this was an exception for the study. Any hard substrate communities located in deep water would be particularly sensitive to impacts. Impacts to these sensitive habitats could permanently prevent recolonization with similar organisms requiring hard substrate, but adherence to the guidance provided in NTL 2000-G-20 should prevent all but minor impacts to hard-bottom communities beyond 454 m (1,500 ft). Under the current review procedures for chemosynthetic communities, carbonate outcrops (high reflectivity surface anomalies on 3D seismic survey data) are targeted as one possible indication that chemosynthetic seep communities are present. Any unique nonchemosynthetic communities that may be associated with carbonate outcrops or other topographical features would be avoided via this review, along with the chemosynthetic communities. Typically, all areas suspected of being hard bottom are avoided as a potential geological hazard for any well sites. Any proposed impacting activity in water depths >400 m (1,312 ft) would automatically trigger the NTL 2000-G20 evaluation described above.

CPA Proposed Action Analysis

For water depths >400 m (1,312 ft), 0-2 blowouts are estimated in the CPA. Resuspended sediments caused from a blowout will have minimal impacts on the full spectrum of soft-bottom community animals, including the possible mortality of a few megafauna organisms such as a crab or shrimp.

The risk of various sizes of oil spills occurring in the CPA is presented in **Tables 3-6 and 3-7**. The probability of oil in any measurable concentration reaching depths of 400 m (1,312 ft) or greater from a surface spill is very small. As discussed in Chapter 4.3.1.5.4 of the Multisale EIS, oil discharges that occur at the seafloor from a pipeline or loss of well control would rise in the water column, surfacing almost directly over the source location, thus not impacting nonchemosynthetic communities.

The 181 South Area is part of the proposed CPA sale area, but there is no evidence of any exposed hard substrate that could support significant nonchemosynthetic communities that would be exposed to any kind of accidental impacts. If new geophysical survey information did indicate the potential presence of hard bottom areas (that could support deepwater corals or other significant communities), the same biological review process and use of NTL 2000-G20 would apply, resulting in a greatly reduced probability of any impacts occurring.

WPA Proposed Action Analysis

For water depths >400 m (1,312 ft), 0-1 blowouts are estimated in the WPA. Resuspended sediments caused from a blowout will have minimal impacts on the full spectrum of soft-bottom community animals, including the possible mortality of a few megafauna organisms such as a crab or shrimp.

The risk of various sizes of oil spills occurring in the WPA is presented in **Tables 3-6 and 3-7**. The probability of oil in any measurable concentration reaching depths of 400 m (1,312 ft) or greater from a surface spill is very small. As discussed in Chapter 4.3.1.5.4 of the Multisale EIS, oil discharges that occur at the seafloor from a pipeline or loss of well control would rise in the water column, surfacing almost directly over the source location, thus not impacting nonchemosynthetic communities.

Summary and Conclusion

Accidental events resulting from a CPA or WPA proposed action are expected to cause little damage to the ecological function or biological productivity of the widespread, typical, deep-sea benthic communities. Some 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. Even in situations where the substantial burial of typical benthic communities occurred, recolonization from populations from neighboring substrate would be expected over a relatively short period of time for all size ranges of organisms, in a matter of hours to days for bacteria and probably less than 1 year for most all macrofauna species.

Deepwater coral habitats and other potential hard-bottom communities not associated with chemosynthetic communities will likely be avoided as a consequence of the application of NTL 2000-G20 and the similar geophysical signatures (hard bottom), indicating the potential presence of chemosynthetic communities.

Accidental events from a CPA or WPA proposed action are expected to cause little damage to the ecological function or biological productivity of the widespread, typical, deep-sea benthic communities.

The MMS has reexamined the analysis for impacts to nonchemosynthetic communities presented in the Multisale EIS, based on the additional information presented above. No significant new information was found that would alter the overall conclusion that impacts on chemosynthetic communities from routine activities associated with a CPA or WPA proposed action would be minimal to none. As part of the proposed CPA sale area, the 181 South Area is not expected to have any sensitive exposed hard bottom that would be exposed to any kind of accidental impacts.

4.1.5.4. Cumulative Impacts

Background/Introduction

Both chemosynthetic communities and nonchemosynthetic deepwater resources will be combined in this chapter. A detailed description of cumulative impacts upon deepwater benthic communities can be found in Chapter 4.5.4.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Cumulative factors considered to impact the deepwater benthic communities of the Gulf of Mexico include both oil- and gas-related and non-oil- and 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 climate change.

There are essentially only three fish (or “shellfish”) species considered important to deepwater commercial bottom fisheries—the yellowedge grouper, tilefish, and royal red shrimp. Each of these is discussed in Chapter 4.5.4.2 of the Multisale EIS. Unlike other areas in the Atlantic and in Europe, bottom fishing and trawling efforts in the deeper water of the CPA and WPA are currently minimal, and impacts to deepwater benthic communities are negligible.

Other regional non-oil- and gas-related sources of cumulative impact to deepwater benthic communities would be possible, but they are considered unlikely to occur. Essentially no anchoring from non-OCS-related activities occurs at the deeper water depths considered for these resources. Some impacts are highly unlikely yet not impossible, such as the sinking of a ship or barge resulting in collision or contaminant release directly on top of a sensitive, high-density chemosynthetic or significant, nonchemosynthetic communities such as coral communities.

One potential significant large-scale source of impact could be potential efforts of carbon sequestration in the deep sea as a technique to reduce atmospheric carbon dioxide. This concept is still being considered but has major ramifications. One side of the issue, even beyond the problems of sea-level increase and climate change, includes the serious risk to shallow-water benthic organisms through pH increases, particularly those with calcium carbonate shells and corals (Shirayama and Thornton, 2005; Kleypas et al., 1999; Barry et al., 2005). However, the impacts of even very small excursions of pH and CO_2 in the deep sea could also have serious, even global, deep-sea ecosystem impacts. Kita and Ohsumi (2004) suggest sequestration of anthropogenic CO_2 could help reduce atmospheric CO_2, but they also summarize the potentially substantial biological impact on marine organisms. It is obvious that substantial additional research is needed before any large-scale actions would take place.

The greatest potential for cumulative adverse impacts to occur to the deepwater benthic communities, both chemosynthetic and nonchemosynthetic, would come from those OCS-related, bottom-disturbing activities associated with pipeline and platform emplacement (including templates and subsea completions), associated anchoring activities, discharges of muds and cuttings, and seafloor blowout accidents. The potential impacts to deepwater benthic communities from these activities were discussed in detail in Chapter 4.5.4.2 of the Multisale EIS.

As exploration and development continue on the Federal OCS, activities have moved farther into the deeper water areas of the Gulf of Mexico. With this trend comes the certainty that increased development will occur on discoveries throughout the entire depth range of the CPA and WPA; these activities will be accompanied by limited unavoidable impacts to the soft-bottom deepwater benthos from bottom disturbances and disruption of the seafloor from associated activities. The extent of these disturbances will be determined by the intensity of development in these deepwater regions, the types of structures and mooring systems used, and the effective application of the avoidance criteria required under NTL 2000-G20. Activity levels for the cumulative scenario in the CPA and WPA are shown in Tables 4-6 and 4-5 of the Multisale EIS, respectively. For the CPA deepwater offshore Subareas C200-400, C400-800 C800-1600, C1600-2400, and C>2400, an estimated 1,445-2,003 exploration and delineation wells and 12,602-14,920 development wells are projected to be drilled, and 114-174 production structures are projected to be installed through the 40-year analysis period. In the same water depths, 84-102 blowout accidents are projected (Table 4-6 of the Multisale EIS). For the WPA deepwater offshore Subareas W200-400, W400-800 W800-1600, W1600-240,0 and W>2400, an estimated 65-97 exploration and delineation wells and 4,139-5,290 development wells are projected to be drilled, and 65-97 production structures are projected to be installed through the 40-year analysis period. For these same water depths, 29-37 blowout accidents are projected (Table 4-5 of the Multisale EIS).

Routine discharges of drilling muds and cuttings have been documented to reach the seafloor in water depths >400 m (1,312 ft) and the impacts have been analyzed in the Multisale EIS, including the results from a recent study by CSA (2006), *Effects of Oil and Gas Exploration and Development at Selected Continental Slope Sites in the Gulf of Mexico*. Potential local cumulative impacts could result from accumulations of muds and cuttings resulting from consistent hydrographic conditions and drilling of multiple wells from the same location causing concentrations of material in a single direction or “splay.” It is not expected that detectable levels of muds and cuttings discharges from separate developments or from adjacent lease blocks would act as a cumulative impact to deepwater benthic communities due their physical separation and great water depths.

Numerous new chemosynthetic communities were recently discovered and explored using the submersible *Alvin* in 2006 and with the remotely operated vehicle *Jason II* in 2007 as part of a new MMS study (Brooks et al., in preparation). These new communities were targeted using the same procedures integral to the biological review process and the use of NTL 2000-G20 targeting areas of potential community areas to be avoided by impacting oil and gas activities. There is no reason to expect an increased vulnerability of these deeper communities to cumulative impacts.

In cases where high-density communities are subjected to greatly dispersed cumulative discharges or resuspended sediments, the impacts are most likely to be sublethal in nature and limited in areal extent. The impacts to ecological function of high-density communities would be minor with recovery occurring within 2 years; however, minor impacts to ecological relationships with the surrounding benthos would also be likely.

Because of the great water depths, treated sanitary wastes and produced waters are not expected to have any adverse cumulative impacts to any deepwater benthic communities. These effluents would undergo a great deal of dilution and dispersion before reaching the bottom, if ever.

A blowout at the seafloor could resuspend large quantities of bottom sediments and even create a large crater, destroying any organisms in the area. Structure removals and other bottom-disturbing activities could resuspend bottom sediments, but not at magnitudes as great as blowout events. The distance of separation provided by the adherence of NTL 2000-G20 would protect both chemosynthetic and nonchemosynthetic communities from the direct effects of deepwater blowouts. Subsea structure removals are not expected in water depths >800 m (2,625 ft), in accordance with 30 CFR 250.

Oil and chemical spills (potentially from non-OCS-related activities) are not considered to be a potential source of measurable impacts on any deepwater communities because of water depth. Oil spills from the surface would tend not to sink. Oil discharges at depth or on the bottom would tend to rise in the water column and similarly not impact the benthos.

Deepwater coral and other hard-bottom communities not associated with chemosynthetic communities are also expected to be protected from cumulative impacts by general adherence to NTL 2000-G20 and the shallow hazards NTL 2007-G01 due to the avoidance of areas represented as hard bottom on surface anomaly maps derived from 3D seismic records. Biological reviews are performed on all deepwater plans (exploration and production) and pipeline applications, which include an analysis of maps and the avoidance of hard-bottom areas that are also one of several important indicators for the potential presence of chemosynthetic communities.

Summary and Conclusion

Cumulative impacts to deepwater communities in the Gulf of Mexico from sources other than OCS activities are considered negligible. 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. Seafloor disturbance is considered to be a threat only to the high-density (Bush Hill-type) communities; the widely distributed low-density communities would not be at risk. The guidance provided in NTL 2000-G20 require surveys and avoidance prior to drilling or pipeline installation and will greatly reduce the 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., in preparation). Confidence is increasing regarding the use of geophysical signatures for the prediction of likely presence of chemosynthetic communities with the dramatic success of this project.

Activities unrelated to the OCS Program include fishing and trawling. Because of the water depths in these areas 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 activities considered under the cumulative scenario are expected to cause little damage to the ecological function or biological productivity of the widespread, low-density chemosynthetic communities. The rarer, widely scattered, high-density, Bush Hill-type chemosynthetic communities could experience isolated minor impacts from drilling discharges or resuspended sediments, with recovery expected within several years, but even minor impacts are not anticipated. If physical disturbance (such as anchor damage) or extensive burial by muds and cuttings were to occur to high-density, Bush Hill-type 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 would permanently prevent reestablishment. The severity of such an impact is such that there would be 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 from populations from neighboring substrates would be expected in any areas impacted by burial. Potential cumulative impacts on deepwater coral or other high-density, hard-bottom communities, similar to chemosynthetic communities, are expected to cause little damage to ecological function or biological productivity. If major physical disturbance (such as anchor damage) or extensive burial by muds and cuttings were to occur to coral or other high-density, nonchemosynthetic hard-bottom communities, impacts could be severe.

The incremental contribution of a CPA or 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 NTL 2000-G20.

The 181 South Area, part of the proposed CPA sale area, is not expected to have any chemosynthetic communities or sensitive exposed hard bottom that would be exposed to any kind of impacts from routine activities or accidental events associated with a proposed action.

4.1.6. Marine Mammals

The MMS has reexamined the analysis of the 29 species of marine mammals occurring in the Gulf of Mexico presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for marine mammals presented in the Multisale EIS. With the exception of manatees, any of the marine species that occur in the Gulf of Mexico may be found in the 181 South Area. However, the 181 South Area is not unique in regards to marine mammal distribution. Impacts from routine activities and accidental events occurring in the 181 South Area are similar to the rest of the sale area.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Routine events related to a CPA or WPA proposed action, particularly when mitigated as required by MMS, are not expected to have long-term adverse effects on the size and productivity of any marine mammal species or population endemic to the northern Gulf of Mexico. Characteristics of impacts from accidental events depend on chronic or acute exposure, resulting in harassment, harm, or mortality to marine mammals, while exposure to dispersed hydrocarbons is likely to result in sublethal impacts. The effects of the incremental contribution of a CPA or WPA proposed action, including the 181 South Area, combined with non-OCS activities may be deleterious to cetaceans occurring in the Gulf of Mexico. Biological significance of any mortality would depend, in part, on the size and reproductive rates of the affected stocks, as well as the number, age, and size of animals affected.

4.1.6.1. Description of the Affected Environment

A detailed description of marine mammals can be found in Chapter 3.2.3 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS. With the exception of manatees, any of the marine species that occur in the Gulf of Mexico may be found in the 181 South Area. However, the 181 South Area is not unique in regards to marine mammal distribution.

Twenty-nine species of marine mammals occur in the Gulf of Mexico (Davis et al., 2000). The Gulf of Mexico's marine mammals are represented by members of the taxonomic order Cetacea, which is divided into the suborders Mysticeti (i.e., baleen whales) and Odontoceti (i.e., toothed whales), as well as the order Sirenia, which includes the manatee and dugong. Within the Gulf of Mexico, there are 28 species of cetaceans (7 mysticete and 21 odontocete species) and 1 sirenian species, the manatee (Jefferson et al., 1992) (**Table 4-4**).

Threatened or Endangered Species

Five baleen cetaceans (the northern right, blue, fin, sei, and humpback whales), one toothed cetacean (the sperm whale), and one sirenian (the West Indian manatee) occur in the Gulf of Mexico and are listed as endangered under the Endangered Species Act of 1973 (ESA). The sperm whale is common in oceanic waters of the northern Gulf of Mexico and appears to be a resident species, while the baleen whales are considered rare or extralimital in the Gulf of Mexico (Würsig et al., 2000). The life history, population dynamics, status, distribution, behavior, and habitat use of baleen and toothed whales can be found in Chapters 3.2.3.1.1 and 3.2.3.1.2 of the Multisale EIS.

The West Indian manatee (*Trichechus manatus*) typically inhabits only coastal marine, brackish, and freshwater areas. The distribution, feeding habits, habitat use, and population estimates of manatees can be found in Chapter 3.2.3.1.3 of the Multisale EIS.

Additional research was conducted to investigate recently available information since completion of the Multisale EIS. A recent report was found. This report presents the results of a study that collected the dive patterns of sperm whales in the Atlantic Ocean to compare them with the dive patterns and social structure of sperm whales in the Gulf of Mexico (Palka and Johnson, 2007). The study started a baseline of line transect, photo-identification, oceanographic, and genetic data for the Atlantic sperm whale. Compared with the Delta region in the Gulf of Mexico, parts of the Atlantic Ocean may serve as a control population of sperm whales with little exposure to sounds of oil- and gas-related activities. The study found that Gulf of Mexico sperm whales follow a foraging and socializing cycle similar to that seen for the North Atlantic whales, but North Atlantic sperm whales dive significantly deeper (average 934 m (3,064 ft) compared with 639 m (2,096 ft) for Gulf of Mexico whales) when foraging (Palka and Johnson, 2007).

Recent Consultation

As mandated by the ESA, MMS consulted with NMFS and FWS on possible and potential impacts from a CPA or WPA proposed action on endangered/threatened species and designated critical habitat under their jurisdiction. A biological assessment (BA) was prepared for each consultation. The action area analyzed in the BA's included the 181 South Area addressed in this SEIS.

The formal ESA consultation with NMFS was concluded with receipt of the Biological Opinion (BO) on July 3, 2007 (USDOC, NMFS, 2007d). The BO concludes that the proposed lease sales and associated activities in the Gulf of Mexico in the 2007-2012 OCS Leasing Program, which includes the 181 South Area, are not likely to jeopardize the continued existence of threatened and endangered species under NMFS jurisdiction or destroy or adversely modify designated critical habitat.

The following information was present in the BO, but not in the Multisale EIS. Based on NOAA's surveys, opportunistic sightings, whaling catches, and stranding records, sperm whales in the Gulf of Mexico occur year-round. Sperm whales appear to favor water depths of about 1,000 m (3,281 ft) and appear to be concentrated in at least two geographic regions of the northern Gulf of Mexico: an area off the Dry Tortugas and offshore of the Mississippi River delta (Maze-Foley and Mullin, 2006); however, distribution also appears influenced by occurrence and movement of cyclonic/anticyclonic currents in the Gulf of Mexico.

The informal ESA consultation with FWS was concluded with a letter dated September 14, 2007. The FWS concurred with the MMS determination that proposed actions of the 2007-2012 OCS Leasing Program were not likely to adversely affect the threatened/endangered species or designated critical habitat under FWS jurisdiction.

Nonendangered Species

Two baleen cetaceans (Bryde's and minke whales) and 20 toothed cetaceans (including sperm whales, beaked whales, and dolphins) occur in the Gulf of Mexico. The life history, population dynamics, status, distribution, behavior, and habitat use of the nonendangered baleen and toothed whales can be found in Chapters 3.2.3.2.1 and 3.2.3.2.2 of the Multisale EIS.

4.1.6.1.1. Factors Influencing Cetacean Distribution and Abundance

The distribution and abundance of cetaceans within the northern Gulf of Mexico is strongly influenced by various mesoscale oceanographic circulation patterns. These patterns are primarily driven by river discharge (primarily the Mississippi/Atchafalaya Rivers), wind stress, and the Loop Current and its derived circulation phenomena. Circulation on the continental shelf is largely wind-driven, with localized effects from freshwater (i.e., river) discharge. Beyond the shelf, mesoscale circulation is largely driven by the Loop Current in the eastern Gulf of Mexico. Approximately once or twice a year, the Loop Current sheds anticyclonic eddies (also called warm-core rings). Anticyclones are long-lived, dynamic features that generally migrate westward and transport large quantities of high-salinity, nutrient-poor water across the near-surface waters of the northern Gulf of Mexico. These anticyclones, in turn, spawn cyclonic eddies (also called cold-core rings) during interaction with one another and upon contact with topographic features of the continental slope and shelf edge. These cyclones contain and maintain high concentrations of nutrients and stimulate localized production (Davis et al., 2000). In the north-central Gulf of Mexico, the relatively narrow continental shelf south of the Mississippi River Delta may be an additional factor affecting cetacean distribution (Davis et al., 2000). Outflow from the mouth of the Mississippi River transports large volumes of low-salinity, nutrient-rich water southward across the continental shelf and over the slope. River outflow also may be entrained within the confluence of a cyclone-anticyclone eddy pair and transported beyond the continental slope. In either case, this input of nutrient-rich water leads to a localized deepwater environment with enhanced productivity and may explain the persistent presence of aggregations of sperm whales within 31 mi (50 km) of the Mississippi River Delta in the vicinity of the Mississippi Canyon.

Tropical Weather

Tropical storms and hurricanes are a normal occurrence in the Gulf of Mexico and along the coast. Generally, the impacts are localized and infrequent. However, in recent years the Gulf of Mexico has been extremely hard hit by several very powerful hurricanes. Few areas of the coast did not suffer some damage in 2004 and 2005. In 2004, Hurricane Ivan took a large toll on oil and gas structures and operations in the Gulf of Mexico and caused widespread damage to the Alabama-Florida Panhandle coast. In 2005, Hurricanes Katrina, Rita, and Wilma reached Category 5 strength in the Gulf of Mexico. These storms caused damage in all five of the Gulf Coast States and caused massive damage to structures and operations both offshore and on land. The actual impacts of these storms on the marine mammals in the Gulf of Mexico have not yet been determined and, for the most part, may remain very difficult to quantify. Examples of impacts that may have affected species include oil, gas, and chemical spills from damaged and destroyed structures and vessels (although no large oil spills were reported, many lesser spills are known to have occurred), increased trash and debris in both offshore and inshore habitats, and increased runoff and silting from wind and rain. These impacts are expected to be temporary. Generally, the offshore species and the offshore habitat are not expected to have been severely affected in the long term. However, the seasonal occurrence of impacts from hurricanes is impossible to predict.

4.1.6.2. Impacts of Routine Events

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA or WPA proposed action on marine mammals is presented in Chapters 4.2.2.1.5 and 4.2.1.1.5 of the Multisale EIS, respectively. These potential effects may be direct or indirect. 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 helicopters, vessels, operating platforms, and drillships; vessel traffic; seismic surveys; explosive structure removals; and marine debris from service vessels and OCS structures.

Some industry-generated effluents are routinely discharged into offshore marine waters. Marine mammals may have some interaction with these discharges. Contaminants in waste discharges and drilling muds might indirectly affect marine mammals through food-chain biomagnification. Although the scope and magnitude of such effects are not known, direct or indirect effects are not expected to be lethal.

There is no conclusive evidence whether anthropogenic noise has or has not caused long-term displacements of, or reductions in, marine mammal populations. Noise associated with OCS activity, including aircraft, drilling noise, and vessels, may affect marine mammals by eliciting a startle response or masking other sounds. However, many of the industry-related sounds are believed to be out of, or on the limits of, marine mammal hearing, and the sounds are also generally temporary. The continued presence of sperm whales in close proximity to some of the deepwater structures in the Gulf of Mexico tends to rule out concerns of permanent displacement from disturbance.

The Federal Aviation Administration (FAA) Advisory Circular 91-36C encourages pilots to maintain higher than minimum altitudes (noted below) over noise-sensitive areas. Corporate helicopter policy states that helicopters should maintain a minimum altitude of 700 ft (213 ft) while in transit offshore and 500 ft (152 ft) while working between platforms. In addition, guidelines and regulations issued by NMFS under the authority of the Marine Mammal Protection Act do include provisions specifying helicopter pilots to maintain an altitude of 1,000 ft (305 ft) within 100 yd (91 m) of marine mammals.

The rapid increase in exploration and development of petroleum resources in deep oceanic waters of the northern Gulf of Mexico has increased the risk of OCS vessel collisions with sperm whales and other deep-diving cetaceans (e.g., *Kogia* and beaked whales). Deep-diving whales may be more vulnerable to vessel strikes because of the extended surface period required to recover from extended deep dives. The MMS has issued regulations and guidelines to minimize the chance of vessel strike to marine mammals with proposed Protected Species Lease Stipulation and NTL 2007-G04, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting."

Wells and platforms could produce sounds at intensities and frequencies that could be heard by marine mammals. Potential effects on Gulf of Mexico marine mammals include disturbance (i.e., subtle changes in behavior, interruption of previous activities, or short- or long-term displacement), masking of natural sounds (e.g., surf and predators) and calls from nonspecifics, stress (physiological), and hearing impairment (permanent or temporary) by explosions and strong nonexplosive sounds.

Seismic operations have the potential to harm marine mammals in close proximity to firing airgun arrays. The proposed Protected Species Lease Stipulation and the several mitigations, including onboard observers and airgun shut-downs for whales in the exclusion zone, included in NTL 2007-G02 ("Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program") minimize the potential of harm from seismic operations to marine mammals.

Structure removals would cause only minor behavioral changes and noninjurious physiological effects on marine mammals as a result of the implementation of MMS NTL guidelines and regulations, and the NMFS Observer Program for explosive removals. To date, there are no documented "takes" of marine mammals resulting from explosive removals of offshore structures.

Many types of materials, including plastics, are used during drilling and production operations. Industry directives for reducing marine debris and MMS's guidelines through its NTL for maintaining awareness of the problem and eliminating accidental loss continue to minimize industry-related trash in the marine environment.

CPA Proposed Action Analysis

Potential effects on marine mammal species may occur from routine activities associated with a CPA proposed action and may be direct or indirect. 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 helicopters, vessels, operating platforms, and drillships; vessel traffic; seismic surveys; explosive structure removals; and marine debris from service vessels and OCS structures. These impacts are similar in the 181 South Area as they are to the rest of the sale area.

Some industry-generated effluents are routinely discharged into offshore marine waters. Indirect effects to marine mammals through prey exposure to discharges are expected to be sublethal. Because OCS discharges are diluted and dispersed in the offshore environment, direct impacts to marine mammals are expected to be negligible.

Helicopter operations (take-offs and landings) projected for a CPA proposed action are 1,004,000-2,241,000 operations over the life of a proposed action. It is unlikely that marine mammals would be affected by routine OCS helicopter traffic operating at the anticipated altitudes. It is expected that about 10 percent of helicopter operations would occur at altitudes below the specified minimums listed above as a result of inclement weather. Routine overflights may elicit a startle response from and interrupt marine mammals nearby (depending on the activity of the animals) (Richardson et al., 1995). Occasional overflights probably have no long-term consequences on marine mammals; however, frequent overflights could have long-term consequences if they repeatedly disrupt vital functions, such as feeding and breeding. Temporary disturbance to marine mammals may occur as helicopters approach or depart OCS facilities if animals are near the facility. Such disturbance is believed negligible.

Service-vessel round trips projected for a CPA proposed action 119,000-241,000 trips over the life of a proposed action. Noise from service-vessel traffic may elicit a startle and/or avoidance reaction from marine mammals or mask their sound reception. There is the possibility of short-term disruption of movement patterns and behavior, but such disruptions are unlikely to affect survival or productivity. Long-term displacement of animals from an area is also a consideration. Increased ship traffic could increase the probability of collisions between ships and marine mammals, resulting in injury or death to some animals.

Noise from drilling activities would be relatively constant during the temporary duration of drilling. Toothed whales echolocate and communicate at higher frequencies than the dominant sounds generated by drilling platforms (Gales, 1982). Bottlenose dolphins, one of the few species in which low-frequency sound detection ability has been studied, have poor sensitivity at the level where most OCS-industry noise energy is concentrated. Baleen whales are apparently more dependent on low-frequency sounds than other marine mammals and may be species of concern regarding OCS-industry noise. However, all baleen whale species except the Bryde's whale are considered extralimital or accidental in the Gulf of Mexico. Bryde's whales are considered rare in the Gulf of Mexico, and observations of this species have been almost exclusively in the Eastern Gulf of Mexico (Davis et al., 2000). Thus, Bryde's whales and other baleen whale species are not likely to be subjected to OCS drilling and production noise.

An additional 2-3 seismic surveys are anticipated in the 181 South Area. Seismic operations have the potential to harm marine mammals in close proximity to firing airgun arrays; however, the proposed Protected Species Lease Stipulation and the several mitigations would minimize the potential of harm from seismic operations to marine mammals.

Potential impacts to marine mammals from the detonation of explosives include lethal and injurious incidental take, as well as physical or acoustic harassment. Injury to the lungs and intestines and/or the auditory system could occur. Harassment of marine mammals as a result of a noninjurious physiological response to the explosion-generated shock wave as well as to the acoustic signature of the detonation is also possible. No explosive removals are projected to occur in >800 m (2,625 ft), which includes the 181 South Area.

Some material is accidentally lost overboard where marine mammals could consume it or become entangled in it. The result of ingesting some materials lost overboard could cause disease or death. Entanglement is a concern as some packaging materials may be of a size and/or shape that could be impossible for marine mammals to jettison. Many of the plastics used by industry could withstand years of saltwater exposure without disintegrating or dissolving. An entangled marine mammal may suffer from acute impaired mobility that compromises its health quickly, or it may decline slowly from diminishing feeding and reproductive capability. The increased energy required to overcome the handicap of entanglement may require more food than the entangled whale can capture.

WPA Proposed Action Analysis

Potential effects on marine mammal species may occur from routine activities associated with a WPA proposed action and may be direct or indirect. 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 helicopters, vessels, operating platforms, and drillships; vessel traffic; seismic surveys; explosive structure removals; and marine debris from service vessels and OCS structures.

Some industry-generated effluents are routinely discharged into offshore marine waters. Indirect effects to marine mammals through prey exposure to discharges are expected to be sublethal. Because OCS discharges are diluted and dispersed in the offshore environment, direct impacts to marine mammals are expected to be negligible.

Helicopter operations (take-off and landings) projected for a WPA proposed action are 400,000-900,000 operations over the life of a proposed action. It is unlikely that marine mammals would be affected by routine OCS helicopter traffic operating at these altitudes. It is expected that about 10 percent of helicopter operations would occur at altitudes below the specified minimums listed above as a result of inclement weather. Routine overflights may elicit a startle response from and interrupt marine mammals nearby (depending on the activity of the animals) (Richardson et al., 1995). Occasional overflights probably have no long-term consequences on marine mammals; however, frequent overflights could have long-term consequences if they repeatedly disrupt vital functions such as feeding and breeding. Temporary disturbance to marine mammals may occur as helicopters approach or depart OCS facilities if animals are near the facility. Such disturbance is believed negligible.

Service-vessel round trips projected for a WPA proposed action are 94,000-155,000 trips over the life of a proposed action. Noise from service-vessel traffic may elicit a startle and/or avoidance reaction from marine mammals or mask their sound reception. There is the possibility of short-term disruption of movement patterns and behavior, but such disruptions are unlikely to affect survival or productivity. Long-term displacement of animals from an area is also a consideration. Increased ship traffic could increase the probability of collisions between ships and marine mammals, resulting in injury or death to some animals.

Noise from drilling activities would be relatively constant during the temporary duration of drilling. Toothed whales echolocate and communicate at higher frequencies than the dominant sounds generated by drilling platforms (Gales, 1982). Bottlenose dolphins, one of the few species in which low-frequency sound detection ability has been studied, have poor sensitivity at the level where most OCS-industry noise energy is concentrated. Baleen whales are apparently more dependent on low-frequency sounds than other marine mammals and may be species of concern regarding OCS-industry noise. However, all baleen whale species, except for the Bryde's whale, are considered extralimital or accidental in the Gulf of Mexico. Bryde's whales are considered rare in the Gulf of Mexico and observations of this species have been almost exclusively in the Eastern Gulf of Mexico (Davis et al., 2000). Thus, Bryde's whales and other baleen whale species are not likely to be subjected to OCS drilling and production noise.

Seismic operations have the potential to harm marine mammals in close proximity to firing airgun arrays; however, the proposed Protected Species Lease Stipulation and the several mitigations would minimize the potential of harm from seismic operations to marine mammals.

Potential impacts to marine mammals from the detonation of explosives include lethal and injurious incidental take, as well as physical or acoustic harassment. Injury to the lungs and intestines and/or auditory system could occur. Harassment of marine mammals as a result of a noninjurious physiological response to the explosion-generated shock wave as well as to the acoustic signature of the detonation is also possible.

Some material is accidentally lost overboard where marine mammals could consume it or become entangled in it. The result of ingesting some materials lost overboard could cause disease or death. Entanglement is a concern, as some packaging materials may be of a size and/or shape that could be impossible for marine mammals to jettison. Many of the plastics used by industry could withstand years of saltwater exposure without disintegrating or dissolving. An entangled marine mammal may suffer from acute impaired mobility that compromises its health quickly, or it may decline slowly from diminishing feeding and reproductive capability. The increased energy required to overcome the handicap of entanglement may require more food than the entangled whale can capture.

Summary and Conclusion

Potential effects on marine mammal species may occur from routine activities associated with a CPA or WPA proposed action may be direct or indirect. 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 helicopters, vessels, operating platforms, and drillships; vessel traffic; explosive structure removals; seismic surveys; and marine debris from service vessels and OCS structures. These impacts are similar in the 181 South Area as they are to the rest of the sale area.

Contaminants in waste discharges and drilling muds might indirectly affect marine mammals through food-chain biomagnification. Although the scope and magnitude of such effects are not known, direct or indirect effects are not expected to be lethal.

There is no conclusive evidence whether anthropogenic noise has or has not caused long-term displacements of, or reductions in, marine mammal populations. Noise associated with a CPA or WPA proposed action, including drilling noise, aircraft, and vessels, may affect marine mammals by eliciting a startle response or masking other sounds. However, many of the industry-related sounds are believed to be out of, or on the limits of, marine mammal hearing, and the sounds are also generally temporary. The continued presence of sperm whales in close proximity to some of the deepwater structures in the Gulf of Mexico tends to rule out concerns of permanent displacement from disturbance.

Small numbers of marine mammals could be killed or injured by a chance collision with a service vessel; however, current MMS requirements and guidelines for vessel operation in the vicinity of protected species should minimize this risk (i.e., the proposed Protected Species Lease Stipulation and NTL 2007-G04).

Seismic operations have the potential to harm marine mammals in close proximity to firing airgun arrays. The proposed Protected Species Lease Stipulation and the several mitigations, including onboard observers and airgun shut-downs for whales in the exclusion zone, included in NTL 2007-G02 ("Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program") minimize the potential of harm from seismic operations to marine mammals.

Marine mammal death or injury is not expected from explosive structure-removal operations. Existing mitigations and those recently developed for structures placed in oceanic waters should continue to minimize adverse effects to marine mammals from these activities.

Marine mammal ingestion of industry-generated debris is a concern. Sperm whales may be particularly at risk because of their suspected feeding behavior involving cruising along the bottom with their mouth open. Entanglement in debris could have serious consequences. A sperm whale could suffer diminished feeding and reproductive success, and potential injury, infection, and death from entanglement in discarded packing materials or debris. Industry has made good progress in debris management on vessels and offshore structures in the last several years. The debris awareness training, instruction, and placards required by the proposed Protected Species Lease Stipulation and NTL 2007-G03 should greatly minimize the amount of debris that is accidentally lost overboard by offshore personnel.

Routine activities related to a CPA or WPA proposed action, particularly when mitigated as required by MMS, are not expected to have long-term adverse effects on the size and productivity of any marine mammal species or population endemic to the northern Gulf of Mexico.

4.1.6.3. Impacts of Accidental Events

Background/Introduction

A detailed description of the possible impacts from accidental events associated with a CPA or WPA proposed action on marine mammals is presented in Chapter 4.4.5 of the Multisale EIS. Accidental, unexpected industrial events associated with a CPA or WPA proposed action could impact marine mammals. Such impacts would primarily be the result of blowouts, oil spills, and/or effects associated with the response to an oil spill.

During a blowout, the pressure waves and noise generated by the eruption of gases and fluids might be significant enough to harass or injure marine mammals, depending on the proximity of the animal to the blowout. The effects of explosions and noise on marine mammals are discussed at length in Chapters 4.2.1.5 and 4.2.2.1.5 of the Multisale EIS.

Marine mammals occur in the inshore, coastal and oceanic waters of the Gulf of Mexico and could be impacted by accidental spills resulting from operations associated with the proposed actions in the CPA and WPA. The potential causes, sizes, and probabilities of oil spills that could occur during drilling, production, and transportation operations associated with a proposed action are presented in Chapter 4.3.1 of the Multisale EIS. Chapter 4.3.1.8 of the Multisale EIS summarizes MMS's information on the risk to marine mammals analyzed in this SEIS from oil spills and oil slicks that could occur as a result of a proposed action.

The greatest diversity and abundance of cetaceans inhabiting the Gulf of Mexico is found in its oceanic and OCS waters. Individual cetaceans are not necessarily randomly distributed in the offshore environment but are, instead, prone to forming groups of varying sizes. In some cases, several species may be found aggregating in the same area. Large spills, particularly those continuing to flow fresh hydrocarbons into oceanic and/or outer shelf waters for extended periods (i.e., days, weeks, or months), pose an increased likelihood of impacting cetacean populations inhabiting these waters.

It is impossible to know precisely which cetacean species, population, or individuals will be impacted, to what magnitude, or in what numbers, since each species has unique distribution patterns in the Gulf of Mexico and because of difficulties attributed to predicting when and where oil spills will occur. Chapter 4.3.1.6.4 of the Multisale EIS details the persistence, spreading, and weathering process for offshore spills.

Blowouts, oil spills, and spill-response activities have the potential to adversely affect marine mammals, causing physical injury and irritation, fouling of baleen plates, respiratory stress from inhalation of toxic fumes, food reduction or contamination, direct ingestion of oil and/or tar, and temporary displacement from preferred habitats or migration routes. If these accidental events occur within marine mammal habitat, impacts will likely follow as animals are exposed to pollutants.

CPA Proposed Action Analysis

Accidental, unexpected industrial events associated with a CPA proposed action could impact marine mammals. Such impacts would primarily be the result of blowouts, oil spills, and/or effects associated with the response to an oil spill. These impacts are similar in the 181 South Area as they are to the rest of the sale area. However, as explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action.

During a blowout, the pressure waves and noise generated by the eruption of gases and fluids might be significant enough to harass or injure marine mammals, depending on the proximity of the animal to the blowout. There are 2-3 blowouts projected from a proposed lease sale in the CPA.

Based on abundance estimates and a hypothetical spill surface area, spills occurring in these waters could impact more species and more individuals than coastal spills potentially impacting coastal marine mammals. The endangered sperm whales use oceanic waters as their principle habitat, and the current abundance estimate for the northern Gulf of Mexico is 1,349 animals (Waring et al., 2006).

The probability of a single marine mammal encountering an oil slick from a single, small spill is extremely low. Also, considering marine mammal populations instead of individual animals increases the probability of impact in that there are numerous animals and an encounter with an oil slick by any one of them could be considered an impact to the population. However, such an impact is not expected to be significant to the population.

Spills of any size degrade water quality, and residuals become available for bioaccumulation within the food chain. Slicks may spread at the sea surface or may migrate underwater from the seafloor through the water column and never broach the sea surface. Regardless, a slick is an expanding but aggregated mass of oil that, with time, will disperse into smaller units as it evaporates (if at the sea surface) and weathers. Although marine mammals may (or may not) avoid oil spills or slicks, it is highly unlikely that they are capable of avoiding spill residuals in their environment. Consequently, the probability that a marine mammal is exposed to hydrocarbons resulting from a spill extends well after the oil spill has dispersed from its initial aggregated mass.

Oil spills have the potential to cause chronic (long-term lethal or sublethal oil-related injuries) and acute (spill-related deaths occurring during a spill) effects on mammals. 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.

WPA Proposed Action Analysis

Accidental, unexpected industrial events associated with a WPA proposed action could impact marine mammals. Such impacts would primarily be the result of blowouts, oil spills, and/or effects associated with the response to an oil spill.

During a blowout, the pressure waves and noise generated by the eruption of gases and fluids might be significant enough to harass or injure marine mammals, depending on the proximity of the animal to the blowout. There are 1-2 blowouts projected to occur from a proposed lease sale in the WPA.

Based on abundance estimates and a hypothetical spill surface area, spills occurring in these waters could impact more species and more individuals than coastal spills potentially impacting coastal marine mammals. The endangered sperm whales use oceanic waters as their principle habitat, and the current abundance estimate for the northern Gulf of Mexico is 1,349 animals (Waring et al., 2006).

The probability of a single marine mammal encountering an oil slick from a single, small spill is extremely low. Also, considering marine mammal populations instead of individual animals increases the probability of impact in that there are numerous animals and an encounter with an oil slick by any one of them could be considered an impact to the population. However, such impact is not expected to be significant to the population.

Spills of any size degrade water quality, and residuals become available for bioaccumulation within the food chain. Slicks may spread at the sea surface or may migrate underwater from the seafloor through the water column and never broach the sea surface. Regardless, a slick is an expanding but aggregated mass of oil that, with time, will disperse into smaller units as it evaporates (if at the sea surface) and weathers. Although marine mammals may (or may not) avoid oil spills or slicks, it is highly unlikely that they are capable of avoiding spill residuals in their environment. Consequently, the probability that a marine mammal is exposed to hydrocarbons resulting from a spill extends well after the oil spill has dispersed from its initial aggregated mass.

Oil spills have the potential to cause chronic (long-term lethal or sublethal oil-related injuries) and acute (spill-related deaths occurring during a spill) effects on mammals. 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.

Recent Consultation

The NMFS believes that a small number of listed species will experience adverse effects as the result of exposure to a large oil spill or ingestion of accidentally spilled oil over the lifetime of the action. However, NMFS is not including an incidental take statement for the incidental take of listed species due to oil exposure. Incidental take, as defined at 50 CFR 402.02, refers only to takings that result from an otherwise lawful activity. The Clean Water Act (33 U.S.C. 1251 *et seq*.), as amended by the Oil Pollution Act of 1990 (33 U.S.C. 2701 *et seq*.), prohibits discharges of harmful quantities of oil, as defined at 40 CFR 110.3, into waters of the United States. Therefore, even though the BO considered the effects on listed species by oil spills that may result from a WPA proposed action, those takings that would result from an unlawful activity (i.e., oil spills) are not specified in this Incidental Take Statement and have no protective coverage under Section 7(o)(2) of the ESA.

Summary and Conclusion

Accidental, unexpected industrial events associated with a CPA or WPA proposed action could impact marine mammals. Such impacts would primarily be the result of blowouts, oil spills, and/or effects associated with the response to an oil spill. These impacts are similar in the 181 South Area as they are to the rest of the sale area. Accidental blowouts, oil spills, and spill-response activities resulting from a CPA or WPA proposed action have the potential to 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. Chronic or acute exposure from accidental events may result in harassment, harm, or mortality to marine mammals occurring in the northern Gulf of Mexico. Exposure to hydrocarbons persisting in the sea following the dispersal of an oil slick is likely to result in sublethal impacts (e.g., decreased health, reproductive fitness, and longevity; and increased vulnerability to disease) to marine mammals.

4.1.6.4. Cumulative Impacts

Background/Introduction

A detailed description of possible cumulative impacts associated with a CPA or WPA proposed action on marine mammals is presented in Chapter 4.5.5 of the Multisale EIS. 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 a proposed action. These activities include effects of the OCS Program (proposed actions, and prior and future OCS sales), State oil and gas activity, commercial shipping, commercial fishing, recreational fishing and boating activity, military operations, scientific research, and natural phenomena. Specific types of impact-producing factors considered in this cumulative analysis include noise from numerous sources, pollution, ingestion and entanglement in marine debris, vessel strikes, habitat degradation, and natural catastrophes.

The major impact-producing factors relative to the CPA and WPA proposed actions are described in Chapters 4.2.2.1.5 and 4.2.1.1.5 of the Multisale EIS, respectively. Sections providing supportive material for the marine mammals analysis include Chapters 3.2.3 (description of marine mammals), 4.1.1.2 (exploration), 4.1.1.3 (development and production), 4.1.1.7 and 4.1.2.1.11 (offshore and coastal noise), 4.1.2.1 (coastal infrastructure), and 4.3.1 and 4.4.5 (spills) of the Multisale EIS.

Noise in the ocean has become a worldwide topic of concern, particularly in the last decade. The Gulf of Mexico is a very noisy place, and noise in the Gulf of Mexico comes from a broad range of sources. Virtually all of the marine mammal species in the Gulf of Mexico have been exposed to OCS-industrial noise due to the rapid advance into Gulf of Mexico deep oceanic waters by the oil and gas industry in recent years; whereas, 20 years ago, the confinement of industry to shallower coastal and continental shelf waters generally only exposed two species of marine mammals (the bottlenose dolphin and the Atlantic spotted dolphin) to industry activities and the related sounds. As noted in Chapter 4.1.1.7

of the Multisale EIS, it is believed that most of the industry-related noise is at lower frequencies than is detectable or in the sensitivity range of most of the Gulf of Mexico marine mammal species. However, most of the information on marine mammal hearing is inferred, and there are reports of species reacting to sounds that were not expected to be audible.

Industry noise sources include seismic operations, fixed platforms and drilling rigs, drilling ships, low-flying aircraft, vessel traffic, and explosive operations, particularly for structure removal. Chapter 4.1.1.7 of the Multisale EIS discusses and shows the expected sources of many of these impacts for the OCS Program, as well as the expected sources from past, present, and future OCS-industry operations. Marine mammal avoidance guidelines listed in the Vessel Strike NTL 2007-G04 ("Vessel Strike Avoidance and Injured/Dead Protected Species Reporting") should minimize the chance of marine mammals being subject to the increased noise level of a service vessel in very close proximity. Aircraft overflights are another source of noise and can cause startle reactions in marine mammals, including rapid diving, change in travel direction, and dispersal of marine mammal groups. Flight level minimum guidelines from NOAA and corporate helicopter policy should help mitigate the industry-related flight noise, though lower altitudes nearshore and as the helicopter lands and departs from rigs could impact marine mammals in close proximity to the structures or shore bases. Occasional overflights are not expected to have long-term impacts on marine mammals.

The OCS-industry drilling impacts were discussed in Chapter 4.1.1 of the Multisale EIS. Although much of the focus is on industry operations in deep water, there is still interest and activity in more shallow and even coastal waters for oil and gas production. Explosive structure removals put considerable sound into the ocean, and these can occur in Federal or State waters. The COE also engages in some explosive and pile-driving operations that create loud but temporary noise. Such COE activities are consulted with NMFS and mitigations are included, often similar to the mitigations employed by MMS in consultation with NMFS. In order to minimize the likelihood of injury to marine mammals from explosive structure removals, MMS has issued guidelines (NTL 2004-G06) to offshore operators. These guidelines will be fortified by programmatic rulemaking under the Marine Mammal Protection Act (MMPA). Observations to minimize the possibility of a marine mammal being near an explosive removal mitigate these loud but very brief noises.

Seismic exploration is the source of the loudest, and perhaps most controversial, OCS-industry activity. Seismic exploration is an integral part of oil and gas discovery, development, and production in the Gulf of Mexico. With technical advances that now allow the extraction of petroleum from the ultra-deep areas of the Gulf of Mexico, seismic surveys are routinely conducted in virtually all water depths of the western Gulf of Mexico. Noise and acoustic disturbance have been topics of great debate in the last several years, and there is general agreement that the use of sonar, particularly by the military, has in some cases been associated with very severe impacts to certain species of marine mammals in recent years. Current research by MMS and partners did not detect avoidance of seismic vessels or airguns by sperm whales. Although that finding (or lack of finding) could be interpreted several ways, it is likely that the whales, which appear to generally remain in the northern Gulf of Mexico year-round, are habituated to seismic operations. Over the long term, stress to a population could cause very significant adverse effects including disease, reproductive failure, and population decline.

The pollution of marine waters is another potentially adverse impact to marine mammals in the Gulf of Mexico. Effluents are routinely discharged into offshore waters and are regulated by USEPA NPDES permits. Marine mammals may periodically be exposed to these discharges. Direct effects to marine mammals are expected to be sublethal. Indirect effects via food sources are not expected because of dilution and dispersion of offshore operational discharges. Another OCS-industry form of pollution is oil spills. Because of dilution and weathering, such contact is expected to be sublethal. Indirect effects from the exposure of prey species to oil are also expected to be sublethal.

Pollution in the ocean comes from many point and nonpoint sources, and the Gulf of Mexico is certainly no exception. The drainage of the Mississippi River results in massive amounts of chemicals and other pollutants being constantly poured into the Gulf of Mexico. Since most of the marine mammals in the Gulf of Mexico are oceanic deepwater dwellers, the impacts of coastal and run-off pollution are greatly minimized as a result of dilution and dispersal. Primarily, the bottlenose dolphin and the manatee are most at risk for nearshore pollution. Given the many sources of unchecked pollution in the Gulf of Mexico, the amount of additional contaminants contributed by the oil and gas industry is negligible.

Marine debris has an impact in the ocean. Plastics in particular, and from many different sources, pose a threat to the environment and a serious threat to marine mammals. Ingestion of plastic can cause a digestive gut blockage and ultimately death for a marine mammal. A wide variety of debris is commonly observed in the Gulf of Mexico and it comes from both terrestrial and marine sources. Since that time, industry has implemented waste management programs and greatly improved waste handling. The debris awareness training required by the proposed Protected Species Lease Stipulation and recommended by NTL 2007-G03 targets the accidental loss of material from vessels and structures. With these practices in place and compliance with applicable regulations and guidelines, the amount of marine debris contributed by a CPA or WPA proposed action would be minimal.

Vessel strikes are a serious threat to marine mammals in the Gulf of Mexico. A collision between a marine mammal and a ship will result in injury and likely death. The increased vessel traffic may alter behavior of marine mammals by avoidance, displacement, or attraction to the vessel. However, those effects are expected to be short term. The Vessel Strike NTL 2007-G04 ("Vessel Strike Avoidance and Injured/Dead Protected Species Reporting") provides guidelines to avoid a vessel/mammal collision and to minimize harassment of mammals by vessels approaching too closely. It also provides for the reporting of injured or dead protected species. Although OCS vessel traffic would be a major component of the cumulative vessel impacts, professional piloting and regulatory guidelines would minimize the impact of the OCS segment of vessel traffic.

Other activities may have adverse effects on marine mammals. Occasionally, numbers of marine mammals strand, either alive or already dead. Die-offs happen infrequently but can seriously deplete small, discreet stocks. The causes of die-offs are not always well known and vary by event. Some appear to be triggered by natural events (i.e., unusually cold weather) but others are suspected to at least be indirectly caused by pollution of various contaminates. Exposure to certain compounds may weaken the natural immunity of marine mammals and make them susceptible to viruses and disease that would normally not affect them.

The Gulf of Mexico has very little fishery interaction with marine mammals, compared with other areas. However, marine mammals can be injured or killed by commercial fishing gear. Mammals can either get hung on longline hooks or can be scooped into a net by a shrimp boat or groundfish vessel. Gillnets, which have now been banned in many places around the Gulf of Mexico, have been reported to take marine mammals.

Lastly, tropical storms and hurricanes are normal occurrences in the Gulf of Mexico and along the Gulf Coast. Generally, the impacts have been localized and infrequent. However, in the last 2 years the Gulf of Mexico has been extremely hard hit by very powerful hurricanes. Few areas of the coast have not suffered some damage in 2004 and 2005, and activities in the Gulf of Mexico have also been severely impacted. Hurricanes have caused damage to all five of the Gulf Coast States and damage to structures and operations both offshore and onshore. The actual impacts of these storms on the animals in the Gulf of Mexico, and the listed species and critical habitat in particular, have not yet been determined and, for the most part, may remain very difficult to quantify. Examples of other impacts that may have affected species include oil, gas, and chemical spills from damaged and destroyed structures and vessels (although no large oil spills were reported, several lesser spills are known to have occurred), increased trash and debris in both offshore and inshore habitats, and increased runoff and silting from wind and rain. Not only are the impacts themselves difficult to assess, but the seasonal occurrence of impacts from hurricanes is also impossible to predict.

Recent Consultation

The proposed lease sales will not appreciably reduce the likelihood of the survival and recovery of sperm whales. The NMFS concluded that the anticipated reduction in numbers by take of sperm whales by oil spills associated with a proposed action, when evaluated in the context of the species' status, the environmental baseline, and the cumulative effects, will not jeopardize the continued existence of sperm whales.

Summary and Conclusion

Activities considered under the cumulative scenario could affect protected cetaceans and sirenians. These marine mammals could be impacted by the degradation of water quality resulting from operational discharges; noise generated by platforms, drillships, helicopters and vessels; seismic surveys; explosive structure removals; oil spills; oil-spill-response activities; loss of debris from service vessels and OCS structures; vessel traffic; commercial fishing; capture and removal; pathogens; and natural catastrophes. The cumulative impact on marine mammals is expected to result in a number of chronic and sporadic sublethal effects (behavioral effects and nonfatal exposure to or intake of OCS-related contaminants or discarded debris) that may stress and/or weaken individuals of a local group or population and predispose them to infection from natural or anthropogenic sources. Few deaths are expected from oil spills, chance collisions with OCS service vessels, ingestion of plastic material, commercial fishing, and pathogens. Oil spills of any size are estimated to be recurring events that would periodically contact marine mammals. Deaths as a result of structure removals are not expected to occur due to mitigation measures (e.g., NOAA's Fisheries Observer Program). Disturbance (e.g., noise from vessel traffic and drilling operations, etc.) and/or exposure to sublethal levels of toxins and anthropogenic contaminants may stress animals, weaken their immune systems, and make them more vulnerable to parasites and diseases that normally would not be fatal. The net result of any disturbance would be dependent 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). Collisions between cetaceans and ships, although expected to be rare events, could cause serious injury or mortality. Natural phenomenon, such as tropical storms and hurricanes, are impossible to predict, but they will occur in the Gulf of Mexico. Generally, the offshore species and the offshore habitat are not expected to have been severely affected in the long term. However, species that occupy more nearshore habitats may have suffered more long-term impacts.

Effects of the incremental contribution of a CPA or WPA proposed action, including the 181 South Area, combined with non-OCS activities may be deleterious to cetaceans occurring in the Gulf of Mexico. Biological significance of any mortality would depend, in part, on the size and reproductive rates of the affected stocks, as well as the number, age, and size of animals affected.

4.1.7. Sea Turtles

The MMS has reexamined the analysis for the five sea turtles species that inhabit the Gulf of Mexico presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. While information from the 5-year status reviews for federally listed sea turtles in the Gulf of Mexico was incorporated, there was no significant new information that would alter the impact conclusion for sea turtles presented in the Multisale EIS, and FWS and NMFS recommended that the current listing classifications remain unchanged. Because the 181 South Area is nearly 130 mi (209 km) from the nearest coast, all five species of sea turtles may potentially exist within the 181 South Area. Impacts from routine activities and accidental events occurring in the 181 South Area are similar to the rest of the sale area. In most foreseeable cases, exposure to hydrocarbons persisting in the sea following the dispersal of an oil slick will result in sublethal impacts (e.g., decreased health, reproductive fitness, and longevity; and increased vulnerability to disease) to sea turtles.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. The routine activities of a proposed action are unlikely to have significant adverse effects on the size and recovery of any sea turtle species or population in the Gulf of Mexico. Accidental events associated with a proposed action have the potential to impact small to large numbers of sea turtles. Populations of sea turtles in the northern Gulf of Mexico would be exposed to residuals of oils spilled as a result of a 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 most foreseeable cases, exposure to hydrocarbons persisting in the sea following the dispersal of an oil slick will result in sublethal impacts. However, the incremental contribution of a CPA or WPA proposed action, including the 181 South Area, to the numerous, cumulative impacts to sea turtles are not expected to be significant, especially due to mitigations currently in place.

4.1.7.1. Description of the Affected Environment

A detailed description of sea turtles in the Gulf of Mexico can be found in Chapter 3.2.4 of the Multisale EIS. The following is a summary of that description, which incorporates new information found since the publication of the Multisale EIS.

Of the seven or eight extant species of sea turtles, five are known to inhabit the waters of the Gulf of Mexico (Pritchard, 1997): the leatherback, green turtle, hawksbill, Kemp's ridley, and loggerhead (**Table 4-5**). These five species are all highly migratory, and no individual members of any of the species are likely to be year-round residents of the analysis area. Individual animals will make migrations into nearshore waters as well as other areas of the North Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea. Because the 181 South Area is nearly 130 mi (2009 km) from the nearest coast, sea turtles may potentially exist within the 181 South Area.

All five species of sea turtles found in the Gulf of Mexico have been federally listed as endangered or threatened since the 1970's. There is currently no critical habitat designated in the Gulf of Mexico.

A search was conducted for new information published since completion of the Multisale EIS. In August 2007, FWS and NMFS published 5-year status reviews for federally listed sea turtles in the Gulf of Mexico (USDOC, NMFS and USDOI, FWS, 2007a-e). A 5-year review is an ESA-mandated process that is conducted to ensure the listing classification of a species as either threatened or endangered is still accurate. Both agencies share jurisdiction for federally listed sea turtles and jointly conducted the reviews. After reviewing all of the best scientific and commercially available information and data, the agencies' biologists recommended that the current listing classification for the five sea turtle species remain unchanged. New Gulf of Mexico information from the 5-year reviews is included in this section.

Natural disturbances such as hurricanes can cause significant destruction of nests and topography of nesting beaches (Pritchard, 1980; Ross and Barwani, 1982; Witherington, 1986). Tropical storms and hurricanes are a normal occurrence in the Gulf of Mexico and along the coast. Generally, the impacts have been localized and infrequent. Few areas of the Gulf Coast have not suffered some damage in 2004 and 2005, and activities in the Gulf of Mexico have also been severely impacted. Some impacts, such as loss of beach habitat, are known to have occurred and will impact sea turtles that would have used those areas for nesting beaches. Increases or decreases in beach armoring and other structures may impact all nesting sea turtles in the areas affected. Hurricanes and tropical activity may temporarily remove some of these barriers to suitable nesting habitat. However, rebuilding may replace and expand the structures, magnifying the impact of natural habitat loss with manmade habitat loss.

Global climate change could result in numerous and severe impacts to sea turtles. Rising sea levels could further diminish available nesting beach habitat. Changing ocean temperatures may alter distribution patterns for sea turtle prey (i.e., jellyfish for leatherbacks). This could impact adult survivability as well as nesting success. Warming temperatures may change the sex ratios of hatchlings as sex is determined by nest temperature. These are just a few examples of potential effects of global climate change. Though extremely difficult to predict, this is a topic of growing concern.

Leatherback Sea Turtle

The leatherback is the most abundant sea turtle in waters over the northern Gulf of Mexico continental slope (Mullin and Hoggard, 2000). Leatherbacks appear to spatially use both continental shelf and slope habitats in the Gulf of Mexico (Fritts et al., 1983b; Collard, 1990; Davis and Fargion, 1996). Surveys suggest that the region from Mississippi Canyon to DeSoto Canyon, especially near the shelf edge, which is north of the 181 South Area, appears to be an important habitat for leatherbacks (Mullin and Hoggard, 2000). Leatherbacks have been frequently sighted in the Gulf of Mexico during both summer and winter (Mullin and Hoggard, 2000).

In Florida, an increase in leatherback nesting numbers from 98 nests in 1988 to 800-900 nests per season in the early 2000's has been recorded. There has been a substantial increase in leatherback nesting in Florida since 1989 (USDOC, NMFS and USDOI, FWS, 2007a). However, there have been no confirmed sightings of leatherbacks coming ashore to nest within the CPA or WPA since 1930 in Texas (USDOI, FWS, 2007a). Although nesting is very rare on Gulf of Mexico beaches, leatherbacks occur in Gulf of Mexico waters. Satellite telemetry and tag returns have shown that some of the leatherbacks present in the Gulf of Mexico were tagged at nesting beaches in Costa Rica and Panama (USDOC, NMFS and USDOI, FWS, 2007a).

The leatherback sea turtle is listed as endangered. Ongoing threats to leatherbacks include ingestion of marine debris, poaching of eggs and animals, and entanglement in longline fishing gear.

Green Sea Turtle

All green sea turtle populations are listed as threatened except for the breeding populations of Florida and the Pacific Coast of Mexico, which are endangered. Green sea turtles are found throughout the Gulf of Mexico and are known to nest on Gulf of Mexico beaches, but in very small numbers.

The east coast of Florida is one of the most important nesting areas for green turtles, and the Florida nesting population is listed as endangered. The green turtle nesting population of Florida appears to be increasing based on 18 years (1989-2006) of nesting data from throughout the State (USDOC, NMFS and USDOI, FWS, 2007b).

The principal cause of past declines and extirpations of green turtle assemblages has been the over-exploitation of green turtles for food and other products. Significant threats on green turtle nesting beaches in the region include beach armoring, erosion control, artificial lighting, and disturbance.

Hawksbill Sea Turtle

Hawksbill sea turtles were once abundant in tropical and subtropical regions. Pelagic-size individuals and small juveniles are not uncommon and are believed to be animals dispersing from nesting beaches in the Yucatán Peninsula of Mexico and farther south in the Caribbean (Amos, 1989). The hawksbill turtle is listed as endangered, and is considered critically endangered by the International Union for the Conservation of Nature (IUCN) based on global population declines of over 80 percent during the last three generations (105 years) (Meylan and Donnelly, 1999). The Atlantic Coast of Florida is the only area in the U.S. where hawksbills nest on a regular basis.

Hawksbills are threatened by all the factors that threaten other marine turtles, including exploitation for meat, eggs, and the curio trade, loss or degradation of nesting and foraging habitats, increased human presence, nest depredation, oil pollution, incidental capture in fishing gear, ingestion of and entanglement in marine debris, and boat collisions (Lutcavage et al., 1997; Meylan and Ehrenfeld, 2000). The primary cause of hawksbill decline has been attributed to centuries of exploitation for tortoiseshell, the beautifully patterned scales that cover the turtle's shell (Parsons, 1972). Another manmade factor that affects hawksbills in foraging areas and on nesting beaches is global climate change (USDOC, NMFS and USDOI, FWS, 2007c).

Kemp's Ridley

Ogren (1988) suggests that the Gulf Coast, from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult ridleys in the northern Gulf of Mexico. Internationally, the Kemp's ridley is considered the most endangered sea turtle. There is no designated critical habitat for the Kemp's ridley sea turtle.

The species occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean. Kemp's ridleys nest in daytime aggregations known as arribadas, primarily at Rancho Nuevo, a stretch of beach in Mexico, Tamaulipas State. A 2007 arribada at Rancho Nuevo included over 4,000 turtles over a 3-day period (USDOC, NMFS and USDOI, FWS, 2007d). Kemp's ridley nests on South Padre Island, Texas, numbered 125 in 2007, and the nesting season had not yet ended. Fifteen nests were counted in Galveston County, Texas. This is the highest count for both Texas areas since the recording of nests began in the 1980's.

Of the seven extant species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Many threats to the future of the species remain, including interactions with fishery gear, marine pollution, foraging habitat destruction, illegal poaching of nests, and the potential threats to nesting beaches from such sources as global climate change, development, and tourism pressures.

Loggerhead Sea Turtle

Loggerhead nesting along the Gulf Coast occurs primarily along the Florida Panhandle, although some nesting has been reported from Texas through Alabama as well (USDOC, NMFS and USDOI, FWS, 1991b). Loggerhead turtles have been primarily sighted in waters over the continental shelf, although many surface sightings of this species have also been made over the outer slope beyond the 1,000-m (3,281-ft) isobath. The loggerhead sea turtle is listed as threatened.

Ongoing threats to the western Atlantic loggerhead populations include incidental takes from dredging, commercial trawling, longline fisheries, and gillnet fisheries; loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; nest predation by native and nonnative predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and disease.

In the past decade, a 39.5 percent decline in the annual number of nests has been reported (USDOC, NMFS and USDOI, FWS, 2007e). The Florida Panhandle Nesting Subpopulation showed a decline of 6.6 percent annually from 1995 to 2005. Along the 47-mi (76-km) stretch of Alabama coastline, 62 loggerhead nests were reported in 2003, 53 in 2004, and 45 in 2006 (data from 2005 is not available). Texas reported two loggerhead nests in 2006 and, prior to the end of the 2007 nesting season, Texas had three loggerhead nests. Louisiana has had no recorded loggerhead nests in the last 5 years. The number of nests in 2007 on Mississippi beaches is expected to be low.

Recent Consultation

As mandated by the ESA, MMS consulted with NMFS and FWS on possible and potential impacts from a CPA or WPA proposed action on endangered/threatened species and designated critical habitat under their jurisdiction. A biological assessment (BA) was prepared for each consultation. The action area analyzed in the BA's included the "181 South Area" addressed in this SEIS.

The formal ESA consultation with NMFS was concluded with receipt of the BO on July 3, 2007 (USDOC, NMFS, 2007d). The BO concludes that the proposed lease sales and associated activities in the Gulf of Mexico in the 2007-2012 OCS Leasing Program, which includes the proposed lease sales addressed in this SEIS, are not likely to jeopardize the continued existence of threatened and endangered species under NMFS jurisdiction or destroy or adversely modify designated critical habitat. Sea turtles are under NMFS jurisdiction except when on the nesting beaches. The NMFS issued an Incidental Take Statement on sea turtle species; the Statement contains reasonable and prudent measures (RPM's) with implementing terms and conditions to help minimize take.

The informal ESA consultation with FWS was concluded by letter dated September 14, 2007. The FWS concurred with the MMS determination that the proposed actions of the 2007-2012 OCS Leasing Program were not likely to adversely affect the threatened/endangered species or designated critical habitat under FWS jurisdiction. Sea turtles are under FWS jurisdiction when on a nesting beach.

4.1.7.2. Impacts of Routine Events

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA or WPA proposed action on sea turtles is presented in Chapters 4.2.2.1.6 and 4.2.1.1.6 of the Multisale EIS, respectively.

The major impact-producing factors resulting from the routine activities associated with a CPA or WPA proposed action that may affect loggerhead, Kemp's ridley, hawksbill, green, and leatherback turtles include water-quality degradation from operational contaminant discharges; noise from seismic exploration, helicopter and vessel traffic, operating platforms, and drillships; vessel collisions; explosive platform removals; and OCS-related trash and debris.

Effluents are routinely discharged into offshore marine waters and are regulated by the USEPA's NPDES permits. Information on the contaminants that would be discharged offshore as a result of a proposed action is provided in Chapter 4.1.1.4 of the Multisale EIS.

Structure installation, pipeline placement, dredging, blowouts, and water quality degradation can impact seagrass bed and live-bottom sea turtle habitats. These impacts are analyzed in detail in Chapters 4.2.2.1.3.3 and 4.2.2.1.4.1.1 of the Multisale EIS. The seagrass and high-salinity marsh components of wetland loss would be indirectly important for sea turtles by reducing the availability of forage species that rely on these sensitive habitats.

Noise from service-vessel traffic and helicopter overflights may elicit a startle reaction from sea turtles and there is the possibility of short-term disruption of activity patterns. In the wild, most sea turtles spend at least 3-6 percent of their time at the surface. Despite the brevity of their respiratory phases, sea turtles sometimes spend as much as 19-26 percent of their time at the surface, engaged in surface basking, feeding, orientation, and mating (Lutcavage et al., 1997). Sea turtles located in shallower waters have shorter surface intervals, whereas turtles occurring in deeper waters have longer surface intervals.

Exploration wells and producing development wells are projected to be drilled as a result of a CPA or WPA proposed action. Potential effects on turtles include disturbance (e.g., subtle changes in behavior and interruption of activity), masking of other sounds (e.g., surf, predators, and vessels), and stress (i.e., physiological).

A wide variety of trash and debris is commonly observed in the Gulf of Mexico. Marine trash and debris comes from a variety of land-based and ocean sources (Cottingham, 1988). Some material is accidentally lost during drilling and production operations.

CPA Proposed Action Analysis

The major impact-producing factors resulting from the routine activities associated with a CPA proposed action that may affect loggerhead, Kemp's ridley, hawksbill, green, and leatherback turtles include water-quality degradation from operational contaminant discharges; noise from seismic exploration, helicopter and vessel traffic, operating platforms, and drillships; vessel collisions; explosive platform removals; and OCS-related trash and debris. These impacts are similar in the 181 South Area as they are to the rest of the sale area.

Turtles may be affected by routinely discharged effluents. Very little information exists on the impact of drilling muds on Gulf of Mexico sea turtles (Tucker and Associates, Inc., 1990).

Little or no damage is expected to the physical integrity, species diversity, or biological productivity of live-bottom marine turtle habitat as a result of a CPA proposed action because these sensitive resources are protected by several mitigation measures established by MMS. These mitigation measures include marine protected species NTL's (**Chapter 1.5**).

An estimated 2,975-6,025 service-vessel round trips are expected to occur annually as a result of a CPA proposed action. Transportation corridors would be through areas where sea turtles have been sighted. It is not known whether turtles exposed to recurring vessel disturbance will be stressed or otherwise affected in a negative but inconspicuous way. Increased vessel traffic will increase the probability of collisions between vessels and turtles, potentially resulting in injury or death to some animals.

The exploration and producing development wells could generate sounds at intensities and frequencies that could be heard by turtles. There is some evidence suggesting that turtles may be receptive to low-frequency sounds, which is at the level where most industrial noise energy is concentrated.

Sea turtles can become entangled in or ingest debris produced by exploration and production activities resulting from a CPA proposed action. Leatherback turtles that mistake plastics for jellyfish may be more vulnerable to gastrointestinal blockage than other sea turtle species. The probability of plastic ingestion/entanglement is unknown.

WPA Proposed Action Analysis

The major impact-producing factors resulting from the routine activities associated with a WPA proposed action that may affect loggerhead, Kemp's ridley, hawksbill, green, and leatherback turtles include water-quality degradation from operational contaminant discharges; noise from seismic exploration, helicopter and vessel traffic, operating platforms, and drillships; vessel collisions; explosive platform removals; and OCS-related trash and debris.

Turtles may be affected by routinely discharged effluents. Very little information exists on the impact of drilling muds on Gulf of Mexico sea turtles (Tucker and Associates, Inc., 1990).

Little or no damage is expected to the physical integrity, species diversity, or biological productivity of live-bottom marine turtle habitat as a result of a WPA proposed action because these sensitive resources are protected by several mitigation measures established by MMS. These mitigation measures include marine protected species NTL's (**Chapter 1.5**).

An estimated 2,350-3,875 service-vessel round trips are expected to occur annually as a result of a WPA proposed action. Transportation corridors would be through areas where sea turtles have been sighted. It is not known whether turtles exposed to recurring vessel disturbance will be stressed or otherwise affected in a negative but inconspicuous way. Increased vessel traffic will increase the probability of collisions between vessels and turtles, potentially resulting in injury or death to some animals.

The exploration and producing development wells could generate sounds at intensities and frequencies that could be heard by turtles. There is some evidence suggesting that turtles may be receptive to low-frequency sounds, which is at the level where most industrial noise energy is concentrated.

Sea turtles can become entangled in or ingest debris produced by exploration and production activities resulting from a WPA proposed action. Leatherback turtles that mistake plastics for jellyfish may be more vulnerable to gastrointestinal blockage than other sea turtle species. The probability of plastic ingestion/entanglement is unknown.

Recent Consultation

The NMFS has determined that the following RPM's are necessary and appropriate to minimize impacts of the incidental take of sea turtles from vessel operation.

(1) The MMS must reduce the potential for sea turtles to be struck and injured by vessels operating in support of oil and gas development activities in the Gulf of Mexico.

(2) The MMS must require the monitoring and reporting of any sea turtles struck or observed to have sign of vessel interaction to assess the actual level of incidental take in comparison with the anticipated incidental take.

In order to be exempt from liability for take prohibited by Section 9 of the ESA, MMS must comply with the following terms and conditions, which implement the RPM's described above. These terms and conditions are nondiscretionary.

The following term and condition implements RPM No. 1:

(1) The MMS must implement NMFS measures to reduce the risk of accidental vessel strikes with sea turtles by use of its legal authorities to ensure implementation of, and compliance with, NTL 2007-G04.

The following terms and conditions implement RPM No. 2:

(1) The MMS must make information available to vessel operators concerning species information on sea turtles in the Gulf of Mexico and reporting of vessel-struck, or injured or dead animals.

(2) The MMS must ensure that all vessel-struck, or injured or dead turtles with indications of vessel interactions are reported to the Sea Turtle Stranding Network Coordinator in the nearest coastal state. Any takes of listed species shall be reported to the NMFS Southeast Regional Office within no more than 24 hr of the incident to takereport.nmfsser@noaa.gov. If an MMS action is responsible for the injured or dead animals (e.g., because of a vessel strike), MMS shall require the responsible parties to assist the respective salvage and stranding network as appropriate. Report dead or injured protected species to your local stranding network contacts.

(3) The MMS must submit an annual report to the NMFS Southeast Regional Office regarding the reports of vessel-struck sea turtles, and injured and dead sea turtles reported from oil and gas operators. Hardcopies of all annual reports will be submitted to the following address:

Assistant Regional Administrator for Protected Resources
National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, FL 33701

The NMFS expects impacts to sea turtles in the proposed lease sale area as a result of OCS oil and gas leasing activities. Based on stranding records, incidental captures during recreational and commercial fishing operations, scientific surveys, and historical data, the five species of sea turtles are known to occur in Gulf of Mexico waters in and around the proposed lease sale areas. The vessel strike avoidance requirements (NTL 2003-G10) will appreciably reduce the numbers of sea turtles that may be incidentally taken from routine offshore vessel operations; however, the available information on the relationship between these species and OCS oil and gas activities indicates that sea turtles may be killed or injured by vessel strikes. Therefore, pursuant to Section 7(b)(4) of the ESA, NMFS anticipates incidental take as follows:

- 119 lethal takes (2.9 individuals annually, on average) and 238 nonlethal takes (5.9 individuals annually, on average) of loggerhead sea turtles over the 40-year lifetime;
- 10 lethal takes (1 individual every 4 years, on average) and 21 nonlethal takes (1 individual every 1.9 years, on average) of leatherback sea turtles over the 40-year lifetime;
- 13 lethal takes (1 individual every 3 years, on average) and 26 nonlethal takes (1 individual every 1.5 years, on average) of Kemp's ridley sea turtles over the 40-year lifetime;
- 38 lethal takes (1 individual every 1.1 years, on average) and 76 nonlethal takes (1.9 individuals annually, on average) of green sea turtles over the 40-year lifetime; and
- 1 lethal take and 1 nonlethal take of a hawksbill sea turtle over the 40-year lifetime.

If the actual incidental take exceeds this level, MMS must immediately reinitiate formal consultation.

Summary and Conclusion

Routine activities resulting from a CPA or WPA proposed action have the potential to harm sea turtles. These animals could be impacted by the degradation of water quality resulting from operational discharges; noise generated by seismic exploration, helicopter and vessel traffic, platforms, and drillships; vessel collisions; and marine debris generated by service vessels and OCS facilities. These impacts are similar in the 181 South Area as they are to the rest of the sale area. Lethal effects are most likely to be from chance collisions with OCS service vessels and ingestion of plastic materials. Most OCS activities are expected to have sublethal effects.

Contaminants in waste discharges and drilling muds might indirectly affect sea turtles through food-chain biomagnification, but there is uncertainty concerning the possible effects. Rapid dilution of the discharges should minimize impact. Chronic sublethal effects (e.g., stress) resulting in persistent physiological or behavioral changes and/or avoidance of impacted areas from noise disturbance could cause declines in survival or fecundity, and result in population declines; however, such declines are not expected. The required seismic operation mitigations, particularly clearance of the impact area of sea turtles and marine mammals prior to ramp-up, and the subsequent gradual ramping up of the airguns, should minimize the impact of rapid onset of, and close proximity to, very loud noise. Vessel traffic is a serious threat to sea turtles. Diligence on the part of vessel operators as encouraged by the vessel strike mitigations should minimize vessel/sea turtle collisions. Actual sea turtle impacts from explosive removals in recent years have been small. The updated pre- and post-detonation mitigations should ensure that injuries remain extremely rare. Greatly improved handling of waste and trash by industry, along with the annual awareness training required by the marine debris mitigations, is decreasing the plastics in the ocean and minimizing the devastating effects on sea turtles. The routine activities of a

CPA or WPA proposed action are unlikely to have significant adverse effects on the size and recovery of any sea turtle species or population in the Gulf of Mexico.

4.1.7.3. Impacts of Accidental Events

Background/Introduction

A detailed description of the possible impacts from accidental events associated with a CPA or WPA proposed action on sea turtles is presented in Chapter 4.4.6 of the Multisale EIS. Accidental, unexpected industrial events associated with a CPA or WPA proposed action could impact sea turtles. Such impacts would primarily be the result of blowouts, oil spills, and/or effects associated with the response to an oil spill.

Blowouts can occur during any phase of development: exploratory drilling, development drilling, production, completion, or workover operations. In the event of a blowout, the eruption of gases and fluids may generate significant pressure waves and noise that may harass, injure, or kill sea turtles, depending on their proximity to the accident.

Since sea turtle habitat in the Gulf of Mexico includes inshore, coastal, and oceanic waters, as well as numerous beaches in the region, sea turtles could be impacted by accidental spills resulting from operations associated with the CPA and WPA proposed actions. The potential causes, sizes, and probabilities of oil spills that could occur during drilling, production, and transportation operations associated with a proposed action are presented in Chapter 4.3.1 of the Multisale EIS.

All neonate sea turtles undertake a passive voyage via oceanic waters following nest evacuation. Depending on the species and population, their voyage in oceanic waters may last 10 or more years. Beaches of the Caribbean Sea and Gulf of Mexico are used as nesting habitat, and hatchlings evacuating these nesting beaches emigrate to oceanic waters seaward of their nesting sites.

Spills of any size degrade water quality and residuals become available for bioaccumulation within the food chain. Slicks may spread at the sea surface or may migrate underwater from the seafloor through the water column and never broach the sea surface. Regardless, a slick is an expanding, but aggregated mass of oil that, with time, will disperse into smaller units as it evaporates (if at the sea surface) and weathers. Chapter 4.3.1.6.4 of the Multisale EIS details the persistence, spreading, and weathering process for offshore spills.

CPA Proposed Action Analysis

Accidental, unexpected industrial events associated with the CPA proposed action could impact sea turtles. Such impacts would primarily be the result of blowouts, oil spills, and/or effects associated with the response to an oil spill. These impacts are similar in the 181 South Area as they are to the rest of the sale area. However, as explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action.

In the event of a blowout, the eruption of gases and fluids may generate significant pressure waves and noise that may harass, injure, or kill sea turtles, depending on their proximity to the accident. Fortunately, improvements in technology and equipment have greatly decreased the occurrence of blowouts.

In general terms, coastal waters of the planning areas are expected to be impacted by many, frequent, small spills (≤1 bbl); few, infrequent, moderately-sized spills (>1 and <1,000 bbl); and a single, large (≥1,000 bbl) spill. Pipelines pose the greatest risk of a large spill occurring in coastal waters. Depending on the timing of the spill's occurrence in coastal waters, its impact and resulting cleanup may interrupt sea turtle migration, feeding, mating, and/or nesting activity for extended periods (days, weeks, months). Aside from the acute effects noted if sea turtles encounter an oil slick, the displacement of sea turtles to less suitable habitats from habitual feeding areas impacted by oil spills may increase vulnerability to predators, disease, or anthropogenic mortality. The interruption of mating and nesting activities for extended periods may influence the recovery of sea turtle populations.

Sea turtle journeys begin as pulsed events, with many hatchlings emerging and emigrating offshore at the same times. Consequently, intermediate to large spills occurring in these waters may impact multiple turtles, particularly neonate or young juvenile sea turtles associating with oceanic fronts or refuging in sargassum mats where oil slicks, decomposing residues, and tarballs are likely to accumulate. Large spills, particularly those flowing fresh hydrocarbons into oceanic and/or outer shelf waters for extended periods (days, weeks, months), pose an increased risk of impacting sea turtles inhabiting these waters.

There is an extremely small probability that a single sea turtle will encounter an oil slick resulting from a single, small spill. It is impossible to estimate precisely what sea turtle species, populations, or individuals will be impacted, to what magnitude, or in what numbers, since each species has unique distribution patterns in the Gulf of Mexico and because of difficulties attributed to estimating when and where oil spills will occur.

As residues of an oil spill disperse and commit to the physical environment (i.e., water, sediments, and particulates), sea turtles of any life history stage may be exposed via the waters that they drink and swim, as well as via the prey they consume. For example, tarballs may be consumed by sea turtles and by other marine organisms, and eventually bioaccumulate within sea turtles. Although sea turtles may (or may not) avoid oil spills or slicks, it is highly unlikely that they are capable of avoiding spill residuals in their environment. Consequently, the probability that a sea turtle is exposed to oil resulting from a spill extends well after the oil spill has dispersed from its initial aggregated mass.

Contact with petroleum and consumption of oil and oil-contaminated prey may seriously impact turtles; there is direct evidence that turtles have been seriously harmed by petroleum spills. Oil spills and residues have the potential to cause chronic (longer-term lethal or sublethal oil-related injuries) and acute (spill-related deaths occurring during a spill) effects on turtles.

Due to spill response and cleanup efforts, much of an oil spill may be recovered before it reaches the coast. However, cleanup efforts in offshore waters may result in additional harm or mortality of sea turtles, particularly to neonates and juveniles. Oil spills and spill-response activities at nesting beaches, such as beach sand removal and compaction, can negatively affect sea turtles. Although spill-response activities such as vehicular and vessel traffic during nesting season are assumed to affect sea turtle habitats, further harm may be limited because of efforts designed to prevent spilled oil from contacting these areas. Increased human presence could influence turtle behavior and/or distribution, thereby stressing animals and making them more vulnerable to predators, the toxicological effects of oil, or other anthropogenic sources of mortality.

WPA Proposed Action Analysis

Accidental, unexpected industrial events associated with a WPA proposed action could impact sea turtles. Such impacts would primarily be the result of blowouts, oil spills, and/or effects associated with the response to an oil spill.

In the event of a blowout, the eruption of gases and fluids may generate significant pressure waves and noise that may harass, injure, or kill sea turtles, depending on their proximity to the accident. Fortunately, improvements in technology and equipment have greatly decreased the occurrence of blowouts.

In general terms, coastal waters of the planning areas are expected to be impacted by many, frequent, small spills (≤1 bbl); few, infrequent, moderately-sized spills (>1 and <1,000 bbl); and a single, large (≥1,000 bbl) spill. Pipelines pose the greatest risk of a large spill occurring in coastal waters. Depending on the timing of the spill's occurrence in coastal waters, its impact and resulting cleanup may interrupt sea turtle migration, feeding, mating, and/or nesting activity for extended periods (days, weeks, months). Aside from the acute effects noted if sea turtles encounter an oil slick, the displacement of sea turtles to less suitable habitats from habitual feeding areas impacted by oil spills may increase vulnerability to predators, disease, or anthropogenic mortality. The interruption of mating and nesting activities for extended periods may influence the recovery of sea turtle populations.

Sea turtle journeys begin as pulsed events, with many hatchlings emerging and emigrating offshore at the same times. Consequently, intermediate to large spills occurring in these waters may impact multiple turtles, particularly neonate or young juvenile sea turtles associating with oceanic fronts or refuging in sargassum mats where oil slicks, decomposing residues, and tarballs are likely to accumulate. Large spills, particularly those flowing fresh hydrocarbons into oceanic and/or outer shelf waters for extended periods (days, weeks, months), pose an increased risk of impacting sea turtles inhabiting these waters.

There is an extremely small probability that a single sea turtle will encounter an oil slick resulting from a single, small spill. It is impossible to estimate precisely what sea turtle species, populations, or individuals will be impacted, to what magnitude, or in what numbers, since each species has unique distribution patterns in the Gulf of Mexico and because of difficulties attributed to estimating when and where oil spills will occur.

As residues of an oil spill disperse and commit to the physical environment (i.e., water, sediments, and particulates), sea turtles of any life history stage may be exposed via the waters that they drink and swim, as well as via the prey they consume. For example, tarballs may be consumed by sea turtles and by other marine organisms, and eventually bioaccumulate within sea turtles. Although sea turtles may (or may not) avoid oil spills or slicks, it is highly unlikely that they are capable of avoiding spill residuals in their environment. Consequently, the probability that a sea turtle is exposed to oil resulting from a spill extends well after the oil spill has dispersed from its initial aggregated mass.

Contact with petroleum and consumption of oil and oil-contaminated prey may seriously impact turtles; there is direct evidence that turtles have been seriously harmed by petroleum spills. Oil spills and residues have the potential to cause chronic (longer-term lethal or sublethal oil-related injuries) and acute (spill-related deaths occurring during a spill) effects on turtles.

Due to spill response and cleanup efforts, much of an oil spill may be recovered before it reaches the coast. However, cleanup efforts in offshore waters may result in additional harm or mortality of sea turtles, particularly to neonates and juveniles. Oil spills and spill-response activities at nesting beaches, such as beach sand removal and compaction, can negatively affect sea turtles. Although spill-response activities such as vehicular and vessel traffic during nesting season are assumed to affect sea turtle habitats, further harm may be limited because of efforts designed to prevent spilled oil from contacting these areas. Increased human presence could influence turtle behavior and/or distribution, thereby stressing animals and making them more vulnerable to predators, the toxicological effects of oil, or other anthropogenic sources of mortality.

Recent Consultation

The NMFS believes that a small number of listed species will experience adverse effects as the result of exposure to a large oil spill or ingestion of accidentally spilled oil over the lifetime of a CPA or WPA proposed action. However, NMFS is not including an Incidental Take Statement for the incidental take of listed species due to oil exposure. Incidental take, as defined at 50 CFR 402.02, refers only to takings that result from an otherwise lawful activity. The Clean Water Act (33 U.S.C. 1251 *et seq*.), as amended by OPA (33 U.S.C. 2701 *et seq*.), prohibits discharges of harmful quantities of oil, as defined at 40 CFR 110.3, into waters of the United States. Therefore, even though the BO considered the effects on listed species by oil spills that may result from a proposed action, those takings that would result from an unlawful activity (i.e., oil spills) are not specified in the Incidental Take Statement and have no protective coverage under Section 7(o)(2) of the ESA.

Summary and Conclusion

Accidental blowouts, oil spills, and spill-response activities resulting from a CPA or WPA 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. These impacts are similar in the 181 South Area as they are to the rest of the sale area. Populations of sea turtles in the northern Gulf of Mexico would be exposed to residuals of oils spilled as a result of a proposed action during their lifetimes. Chronic or acute exposure from accidental events may result in the harassment, harm, or mortality to sea turtles occurring in the northern Gulf of Mexico. In most foreseeable cases, exposure to hydrocarbons persisting in the sea following the dispersal of an oil slick will result in sublethal impacts (e.g., decreased health, reproductive fitness, and longevity; and increased vulnerability to disease) to sea turtles. Sea turtle hatchling exposure to, fouling by, or consumption of tarballs persisting in the sea following the dispersal of an oil slick would likely be fatal.

4.1.7.4. Cumulative Impacts

Background/Introduction

A detailed description of possible cumulative impacts on sea turtles is presented in Chapter 4.5.6 of the Multisale EIS. This cumulative analysis considers the effects of impact-producing factors related to a CPA or 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 proposed actions. The combination of potential impacts resulting from a proposed action in addition to prior and future OCS sales, dredging operations, beach nourishment, beach lighting, power plant entrainment, military operations, water quality degradation, noise from numerous sources, vessel traffic, marine debris, pollution, recreational and commercial fishing, human consumption, and natural catastrophes affect the loggerhead, Kemp's ridley, hawksbill, green, and leatherback turtles found in the Gulf of Mexico. Major impact-producing factors related to the CPA and WPA proposed actions that may occur are reviewed in detail in Chapters 4.2.2.1.6 and 4.2.1.1.6 of the Multisale EIS, respectively. Sections providing supportive material for the sea turtle analysis include Chapters 3.1 (physical environment), 3.2.4 (description of sea turtles), 4.1.1 (offshore impact-producing factors), 4.1.2 (coastal impact-producing factors), 4.1.3 (other activities), and 4.4 (environmental impacts of accidental events) of the Multisale EIS.

The Gulf Coast is a well-populated and growing area, and development of previously unusable land for residential and commercial purposes is common. Increased populations often result in increased runoff and dumping. Many areas around the Gulf of Mexico already suffer from very high contaminant counts due to river and coastal runoff and discharges. Contaminants may accumulate in species or in prey species. Effluents are routinely discharged into offshore waters and are regulated by USEPA NPDES permits. Most operational discharges are diluted and dispersed when released in offshore areas and, due to the USEPA permit regulations on discharges, are considered to have little effect (API, 1989; Kennicutt, 1995). Any potential that might exist for impact from drilling fluids would more likely be indirect, either by impact on prey items or possibly through ingestion via the food chain (API, 1989). Contaminants in drilling mud discharge may biomagnify and bioaccumulate in the food web, which may kill or debilitate important prey species of sea turtles or species lower in the marine food web. This could ultimately reduce reproductive fitness or longevity in sea turtles.

Dredge-and-fill activities occur in many of the coastal areas inhabited by sea turtles. Operations range in scope from propeller dredging (scarring) by recreational boats to large-scale navigation dredging and fill for land reclamation. Dredging operations affect turtles through accidental take and habitat degradation. The construction and maintenance of Federal navigation channels has been identified as a source of sea turtle mortality. In addition to direct take, channelization of the inshore and nearshore areas can degrade foraging and migratory habitats via spoil dumping, degraded water quality/clarity, and altered current flow.

Structure installation and removal, pipeline placement, dredging, and water quality degradation may adversely affect sea turtle foraging habitat through destruction of seagrass beds and live-bottom communities used by sea turtles (Gibson and Smith, 1999). At the same time, it should be noted that structure installation creates habitat for subadult and adult sea turtles, which may enhance the recovery of some turtle populations.

Noise from service-vessel and helicopter traffic may cause a startle reaction from sea turtles and produce temporary stress (NRC, 1990). Additional activities, including vessel operations and ordnance detonation, also affect sea turtles. Private and commercial air traffic also traverse these areas and have the potential to cause impacts to sea turtles. Other sound sources potentially impacting sea turtles include seismic surveys and drilling noise. The potential impacts of anthropogenic sounds on sea turtles include physical auditory effects (temporary threshold shift), behavioral disruption, long-term effects, masking, and adverse impacts on prey species. Noise-induced stress has not been studied in sea turtles. Seismic surveys use airguns to generate sound pulses, which are a more intense sound than other nonexplosive sound sources. Seismic activities are expected to be primarily annoyance to sea turtles and cause a short-term behavioral response. However, sea turtles are included in the mitigations required of all seismic vessels operating in the Gulf of Mexico, as stated in NTL 2007-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program."

Explosive discharges such as those used for MMS and COE structure removals can cause injury to sea turtles (Duronslet et al., 1986). Although sea turtles far from the site may suffer only disorientation, those near detonation sites could sustain fatal injuries. Other potential impacts include physical or acoustic harassment. Resuspension of bottom sediments, increased water turbidity, and mobilization of bottom sediments due to explosive detonation are considered to be temporary effects. To minimize the likelihood of removals occurring when sea turtles may be nearby, MMS issued guidelines for explosive platform removal to offshore operators. With these existing protective measures (NMFS Observer Program and daylight-only demolition) in place, the "take" of sea turtles during structure removals has been limited.

Increased surfacing places turtles at greater risk of vessel collision. Vessel traffic, particularly supply boats running from shore bases to offshore structures, is one of the industry activities included in these proposed actions. Collisions between service vessels or barges and sea turtles would likely cause fatal injuries. In response to terms and conditions of previous NMFS Biological Opinions, and in an effort to minimize the potential for industry-related vessel strikes to sea turtles, MMS issued NTL 2007-G04, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting." The NMFS has recommended conservation measures for operations of agency, contract or private vessels to minimize impacts on listed species. However, these actions represent the potential for some level of interaction and, in some cases, conservation measures only apply to areas outside the proposed action areas.

Sea turtles may be seriously impacted by marine debris. Floating plastics and other debris, such as petroleum residues drifting on the sea surface, accumulate in sargassum drift lines commonly inhabited by hatchling sea turtles. These materials could be toxic. The MMS prohibits the disposal of equipment, containers, and other materials into offshore waters by lessees (30 CFR 250.40). In addition, MARPOL, Annex V, Public Law 100-220 (101 Statute 1458), prohibits the disposal of plastics at sea or in coastal waters.

Pollution of marine waters is another potentially adverse impact to sea turtles in the Gulf of Mexico. Since sea turtle habitat in the Gulf of Mexico includes both inshore and offshore areas, sea turtles are likely to encounter spills. The probability that a sea turtle is exposed to hydrocarbons resulting from a spill extends well after the oil spill has dispersed from its initial aggregated mass. Oil spills can adversely affect sea turtles by toxic ingestion or blockage of the digestive tract, inflammatory dermatitis, ventilatory disturbance, disruption or failure of salt gland function, red blood cell disturbances, immune responses, and displacement from important habitat areas (Witham, 1978; Vargo et al., 1986; Lutz and Lutcavage, 1989; Lutcavage et al., 1995). Although disturbances may be temporary, turtles chronically ingesting oil may experience organ degeneration. Exposure to oil may be fatal, particularly to juvenile and hatchling sea turtles.

Oil-spill-response activities, such as vehicular and vessel traffic in coastal areas of seagrass beds and live-bottom communities, can alter sea turtle habitat and displace sea turtles from these areas. The strategy for cleanup operations should vary, depending on season, recognizing that disturbance to nests may be more detrimental than oil (Fritts and McGehee, 1982). As mandated by the OPA (**Chapter 1.3**), these areas are expected to receive individual consideration during oil-spill cleanup.

Human consumption of turtle eggs, meat, or by-products occurs worldwide and depletes turtle populations (Cato et al., 1978; Mack and Duplaix, 1979). Commercial harvests are no longer permitted within continental U.S. waters, and Mexico has banned such activity (Aridjis, 1990). Since sea turtles are highly migratory species, the taking of turtles in subsistence and commercial sea turtle fisheries is still a concern.

Tropical storms and hurricanes are a normal occurrence in the Gulf of Mexico and along the coast. Generally, the impacts have been localized and infrequent. However, in the last two years the Gulf of Mexico has been extremely hard hit by very powerful hurricanes. Few areas of the coast have not suffered some damage in 2004-2005, and activities in the Gulf of Mexico have also been severely impacted. Hurricanes have caused damage to all five of the Gulf Coast States and to structures and operations both offshore and onshore. The actual impacts of these storms on the animals in the Gulf of Mexico, and the listed species and critical habitat in particular, have not yet been determined and, for the most part, may remain very difficult to quantify. However, some impacts, such as loss of beach habitat, are known to have occurred and will impact sea turtles that would have used those areas for nesting beaches. Oil, gas, and chemical spills from damaged and destroyed structures and vessels may have impacted sea turtles (although no large oil spills were reported, several lesser spills are known to have occurred). Increased trash and debris in both offshore and inshore habitats affected sea turtles. Increased runoff and silting from wind and rain may have affected water quality.

Recent Consultation

The proposed lease sales will not appreciably reduce the likelihood of the survival and recovery in the wild of any of the five species of sea turtles considered in the Biological Opinion. The NMFS concluded that the anticipated reduction in numbers by take of sea turtles by vessel strikes and oil spills associated with the CPA and WPA proposed actions, when evaluated in the context of each species' status, the environmental baseline, and the cumulative effects, are not expected to jeopardize the continued existence of loggerhead, leatherback, Kemp's ridley, green, or hawksbill sea turtles.

Summary and Conclusion

Activities considered under the cumulative scenario may harm sea turtles and their habitats. Those activities include structure installation, dredge operations, beach lighting, power plant entrainment, water quality and habitat degradation, seismic surveys, explosive structure removals, vessel traffic and collisions, OCS-related marine debris, oil spills, oil-spill-response activities, pollution, commercial and recreational fishing, human consumption, and natural catastrophes. It is expected that deaths as a result of structure removals would rarely occur because of mitigation measures. The presence of, and noise produced by, service vessels and by the construction, operation, and removal of drill rigs may cause physiological stress and make animals more susceptible to disease or predation, as well as disrupt normal activities. Sea turtles could be killed or injured by chance collision with service vessels or by eating marine debris, particularly plastic items, lost from OCS structures and service vessels. Contaminants in waste discharges and drilling muds might indirectly affect sea turtles through food-chain biomagnification. Oil spills and oil-spill-response activities are potential threats that may be expected to cause turtle deaths. Contact with, and consumption of oil and oil-contaminated prey, may seriously impact turtles. The majority of OCS activities are estimated to be sublethal (behavioral effects and nonfatal exposure to intake of OCS-related contaminants or debris). Chronic sublethal effects (e.g., stress) resulting in persistent physiological or behavioral changes and/or avoidance of impacted areas could cause declines in survival or productivity, resulting in either acute or gradual population declines. However, mitigations currently in place have, and will continue to, minimize sea turtle impacts. Natural phenomenon, such as tropical storms and hurricanes, are impossible to predict, but they will occur in the Gulf of Mexico. Generally, the offshore species and the offshore habitat are not expected to be severely affected in the long-term. However, species that occupy more nearshore habitats and those that use nearshore habitats (sea turtle nesting) may suffer more long-term impacts. Effects of the incremental contribution are similar in the 181 South Area as they are to the rest of the sale area. These numerous, cumulative impacts to sea turtles are not expected to be significant, especially due to mitigations currently in place.

4.1.8. Alabama, Choctawhatchee, St. Andrew, and Perdido Key Beach Mice

The MMS has reexamined the analysis for beach mice presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for beach mice presented in the Multisale EIS. Due to the extended distance from shore, impacts associated with activities occurring in the 181 South Area are not expected to impact beach mice.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. An impact from consumption of beach trash and debris associated with a 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 a 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 not properly regulated, oil-spill-response and cleanup activities could have a significant impact to the beach mice and their habitat. Cumulative activities posing the greatest potential harm to beach mice are non-OCS factors and natural catastrophes, which, in combination, could potentially deplete some beach mice populations to unsustainable levels. The expected incremental contribution of a CPA proposed action to the cumulative impacts is negligible. Because beach mice are located such a far distance from the proposed WPA sale area, the impacts of a WPA proposed action have not been analyzed.

4.1.8.1. Description of the Affected Environment

A detailed description of habitats, diet, reproduction, and tropical storm impacts on beach mice can be found in Chapter 3.2.5 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS. Because the 181 South Area is over 180 mi (290 km) from the nearest beach mouse habitat, the area is not applicable to this discussion.

Of the Gulf Coast subspecies of field mice (*Peromyscus polionotus*), the Alabama, Choctawhatchee, St. Andrew, and Perdido Key beach mice occupy restricted habitats in the mature coastal dunes of Florida and Alabama. All four mice are listed as endangered: the Alabama subspecies in Alabama, and the Perdido Key, St. Andrew, and Choctawhatchee subspecies in Florida (USDOI, FWS, 1987). Populations have fallen to levels approaching extinction. The Alabama, Perdido Key, and Choctawhatchee beach mice were listed as endangered in the 1980's. The St. Andrew beach mouse was not listed as endangered until 1998; it is the only listed subspecies without designated critical habitat. Continued monitoring of populations of all subspecies along the Gulf Coast between 1985 and the present indicates that approximately 52 km (32.3 mi) of coastal dune habitat are now occupied by the four listed subspecies (1/3 of the historic range).

Beach mice were listed because of the loss of coastal habitat from human development. The reduced distribution and numbers of beach mice have continued because of multiple habitat threats over their entire range (e.g., coastal development and associated human activities, military activities, coastal erosion, and weather). The FWS (USDOI, FWS, 2006) cites habitat loss as the primary cause for declines in populations of beach mice. The development of beachfront real estate along coastal areas and the catastrophic alteration by hurricanes are the primary contributors to loss of habitat. The destruction of Gulf Coast sand dune ecosystems for commercial and residential development has destroyed about 60 percent of original beach mouse habitat (Holliman, 1983). Studies indicate that this continues to be a problem (Douglass et al., 1999; South Alabama Regional Planning Commission, 2001).

Habitat reduction and fragmentation have affected the ability of beach mice to quickly recover following tropical storms. The combinations of habitat loss to beachfront development, isolation of remaining habitat blocks and beach mouse populations, and destruction of remaining habitat by hurricanes has increased the threat of extinction for the Alabama, Choctawhatchee, St. Andrew, and Perdido Key beach mice within the last 20-30 years (USDOI, FWS, 2006).

Beach mice are restricted to the coastal barrier sand dunes along the Gulf. The inland extent of beach mouse habitat may vary depending on the configuration of the sand dune system and the vegetation present. Optimal overall beach mouse habitat is currently thought to be comprised of a heterogeneous mix of interconnected habitats including primary dunes, secondary dunes, scrub dunes, and interdunal areas. Beach mice feed nocturnally in the dunes and remain in burrows during the day. Their diets vary seasonally but consist mainly of seeds, fruits, and insects (Ehrhart, 1978; Moyers, 1996). Management practices designed to promote recovery of dune habitat, increase food sources, and enhance habitat heterogeneity may aid in recovery of beach mouse populations. In wild populations, beach mice have an average life span of about 9 months.

Hurricanes are a natural environmental phenomenon affecting the Gulf Coast, and beach mice have evolved and persisted in coastal dune habitats since the Pleistocene. Tropical storms periodically devastate Gulf Coast sand dune communities, dramatically altering or destroying habitat, and either drowning beach mice or forcing them to concentrate on high scrub dunes where they are exposed to predators. While Alabama beach mouse numbers and habitat quality in the frontal dunes ebb and flow in response to tropical storms, the higher elevation scrub habitat is important to mouse conservation as a more stable environment during and after storm events.

A search was conducted for new information published since completion of the Multisale EIS. A search of Internet bibliographic databases (Google, 2007a and b; OCLC FirstSearch, 2007), as well as personal interviews with subject-matter experts in other agencies, was conducted to determine the availability of recent information. Leblanc (personal communication, 2007) revealed that a population genetics study on the Alabama beach mouse was published in 2007 (Tenaglia et al., 2007). Adult males were often trapped with adult females, probably their mates in this monogamous species. These pairs were more distantly related than expected, probably because kin recognition allowed selection of unrelated mates to avoid inbreeding depression, reduced fitness of a population as a result of breeding of related individuals. As population levels have declined, inbreeding avoidance has become important to this subspecies. Subadults were often captured with related mice, suggesting that mice form sibling and adult-subadult familial bonds before final adult dispersal, which itself is a short distance. Consequences for inbreeding impacts remain to be investigated. Sneckenberger (personal communication, 2007) reported no new articles on beach mice in Florida.

4.1.8.2. Impacts of Routine Events

A detailed description of routine impacts on beach mice associated with a CPA proposed action can be found in Chapter 4.2.2.1.7 in the Multisale EIS.

This chapter discusses the possible effects of routine activities associated with a CPA proposed action on the Alabama, Choctawhatchee, St. Andrew, and Perdido Key beach mice, which are designated as protected species under the ESA (**Chapter 1.3**). The mice occupy restricted habitat behind coastal foredunes of Florida and Alabama (Ehrhart, 1978; USDOI, FWS, 1987). Portions of the beach mouse habitat have been designated as critical.

CPA Proposed Action Analysis

The major routine impact-producing factors associated with a 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. Beach mice may mistakenly consume trash and debris or may become entangled in debris. A proposed action is expected to contribute negligible marine debris or disruption to beach mice areas. Unless properly regulated, personnel removing marine debris may temporarily scare away beach mice, destroy their food resources such as sea oats, or trample the tops of their burrows. Due to the extended distance from shore, impacts associated with activities occurring in the 181 South Area are not expected to impact beach mice.

Summary and Conclusion

An impact from a CPA proposed action on the Alabama, Choctawhatchee, St. Andrew, and Perdido Key beach mice is possible but unlikely. An impact may result from the consumption of beach trash and debris. A proposed action would deposit only a small portion of the total debris that would reach the habitat. Unless adequately regulated, efforts undertaken for the removal of marine debris may temporarily scare away beach mice, destroy their food resources, or collapse the tops of their burrows.

4.1.8.3. Impacts of Accidental Events

A detailed description of accidental impacts upon beach mice can be found in Chapter 4.4.7 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Direct contact with spilled oil can cause skin and eye irritation and subsequent infection for endangered beach mice. The fur will be matted and lose its insulation against heat and cold. Sweat glands, ear tissues, and throat tissues may be irritated or infected. The disruption of sight and hearing increases the vulnerability to predators. Other direct toxic effects may include asphyxiation from inhalation of fumes. Direct contact may result from oil ingestion or food contamination. Indirect impacts from oil spills would include reduction of food supply, destruction of habitat, and fouling of nests. Recovery of habitat from hurricanes involves a vital link between mouse food supply (involving seeds of dune-stabilizing vegetation) and habitat. The link is not unique to the beach mouse (it may occur in many habitats) and may be lost after an oil spill, and loss may result in extinction of the beach mouse after later serious storms or hurricanes or further beachfront development disrupt habitat. Impacts can also occur from spill-response activities. Vehicular traffic and other activities associated with oil-spill cleanup can degrade preferred habitat and cause displacement of mice from these areas without regulation.

There is no definitive information on the persistence of oil in the event that a spill was to contact beach mouse habitat. In Prince William Sound, Alaska, after the *Exxon Valdez* spill in 1989, buried oil has been measured in the intertidal zone of beaches, but no effort has been made to search for residual buried oil above high tide. Similarly, NRC (2003) makes no mention of studies of oil left above high tide after a spill. Regardless of the potential for persistence of oil in beach mouse habitat, a slick cannot wash over the foredunes unless carried by a heavy storm swell.

CPA Proposed Action Analysis

The ranges of the four endangered subspecies of beach mice are shown in **Figure 3-9** as revised by FWS for this SEIS. The oiling of beach mice could result in extinction if it occurs on a large scale (over the entire range of one of the subspecies), but this is very unlikely, given the chance of impact to the habitat is <0.5 percent, and the area of viable habitat is broad relative to the area potentially contacted by a major spill.

The 181 South Area is over 180 mi (290 km) from the nearest beach mouse habitat. Of spills originating from the 181 South Area, only spills ≥1,000 bbl could persist long enough to possibly contact beach mouse habitat. As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. For a CPA proposed action, including the 181 South Area, the probabilities remain low (<0.5%) that one or more offshore spills ≥1,000 bbl would occur and contact the shoreline inhabited by the Alabama, Choctawhatchee, St. Andrews, and Perdido Key beach mice during the 40-year life of a proposed action. Spills in coastal waters could occur at storage or processing facilities, and service bases supporting the proposed action; however, these facilities would not be located near beach mouse habitat.

Summary and Conclusion

The oiling of beach mice could result in extinction if it occurs on a large scale (over the entire range of one of the subspecies). Oil-spill-response and cleanup activities could also have a significant impact to the beach mice and their habitat if not properly regulated. However, potential spills that could result from the proposed actions are not expected to contact beach mice or their habitats. The addition of the 181 South Area would not increase the risk of impacts from accidental events on beach mouse habitat.

The MMS has reexamined the analysis for impacts to beach mice presented in the Multisale EIS, based on the additional information presented above. No significant new information was found that would alter the overall conclusion that impacts on beach mice from accidental impacts associated with a CPA proposed action would be minimal

4.1.8.4. Cumulative Impacts

A detailed description of cumulative impacts upon beach mice can be found in Chapter 4.5.7 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Cumulative activities have a 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, and consumption of beach trash and debris. 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 activities posing the greatest potential harm to beach mice are non-OCS factors (i.e., beach development, domestic cats, and coastal spills) and natural catastrophes (i.e., hurricanes and tropical storms), which, in combination, could potentially deplete some beach mice populations to unsustainable levels. The expected incremental contribution of a CPA proposed action to the cumulative impacts is negligible.

A search was conducted for new information published since completion of the Multisale EIS. A search of Internet bibliographic databases (Google, 2007a and b; OCLC FirstSearch, 2007) as well as personal interviews with subject-matter experts in other agencies was conducted to determine availability of recent information. Sneckenberger (personal communication, 2007) reported no new articles on beach mice in Florida.

The results of a baseline Population and Habitat Viability Analysis (PHVA) model of the Alabama beach mouse (Traylor-Holzer et al., 2005) suggest that the Alabama beach mouse metapopulation has an 18-21 percent probability of extinction over 100 years, depending on whether the habitat recovers slowly or quickly following hurricanes. Sensitivity tests for the model give probabilities of extinction of 13-36 percent over 100 years. Habitat restoration reduces the probability of Alabama beach mouse extinction at or immediately following a hurricane. Recolonization by translocation could eliminate the possibility of Alabama beach mouse extinction. A relatively small number of domestic cats would result in virtually certain extinction of the Alabama beach mouse. Development scenarios have, at most, minor impacts on the estimates of probabilities of Alabama beach mouse extinction. Many of the model parameters were uncertain and may have been inaccurate, resulting in uncertainty in the probability of Alabama beach mouse extinction. Revision of the model using data collected after Hurricane Ivan (Traylor-Holzer, 2005) projects a 14 percent risk of extinction over the next 100 years. Much of the risk is from hurricanes. None of the revised development scenarios result in certain Alabama beach mouse extinction. The highest risk from development is a 34 percent chance of extinction over 100 years. Under the revised model, habitat restoration efforts are unlikely to substantially reduce or eliminate extinction risk. Data collected after Hurricane Katrina were used in a second revision of the model (Reed and Traylor-Holzer, 2006). The revised model projects a risk of extinction of 26.8 ± 1.0 percent over the next 100 years. Destruction of migration corridors between populations raises the risk to 41.2 ± 1.1 percent, but only to 34.9 ± 1.1 percent with the translocation of mice. Total loss of private land as suitable habitat raises the risk further to 46.8 ± 1.1 percent, but only 40.8 ± 1.1 percent with the translocation of mice. Hanski (1999) warns that simpler metapopulation models, such as that done for the Alabama beach mouse, are more reliable than PVHA models because predictions of PHVA and Population Viability Analysis (PVA) models cannot be tested (only intrinsic sensitivity to changes in various parameters can be tested). The Incidence Function Model is an example of a testable metapopulation model (Hanski, 1999).

No recent information was found that would necessitate a reanalysis of the cumulative impacts of a proposed action in the Multisale EIS upon the Alabama, Choctawhatchee, St. Andrew, and Perdido Key beach mice. The analysis and potential impacts detailed in the Multisale EIS apply for the SEIS. Due to the extended distance from shore, the incremental impacts associated with activities occurring in the 181 South Area are not expected to impact beach mice.

Summary and Conclusion

Cumulative activities posing the greatest potential harm to beach mice are non-OCS factors and natural catastrophes, which, in combination, could potentially deplete some beach mice populations to unsustainable levels. This conclusion is supported by a recent population model of the Alabama beach mouse. Impacts from a CPA proposed action could come from trash and debris and effort to remove them, as well as oil spills and cleanup operations. The expected incremental contribution of a CPA proposed action to the cumulative impacts is negligible. No additional incremental impacts on beach mice associated with activities occurring in the 181 South Area are expected.

4.1.9. Coastal and Marine Birds

The MMS has reexamined the analysis for coastal and marine birds presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for coastal and marine birds presented in the Multisale EIS. Use of the 181 South Area by breeding or nonbreeding seabirds is unknown; however, the 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity. Therefore, no additional impacts on coastal and marine birds are projected as a result of the inclusion of the 181 South Area. Disturbance to seabirds in the 181 South Area would be similar to disturbance to the birds in the other offshore waters of the proposed lease sale areas. Endangered or threatened bird species (i.e., piping plover, whooping crane, and brown pelican) that inhabit or frequent the north-central and western Gulf of Mexico coastal areas are not expected to occur in the 181 South Area.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. The majority of impacts resulting from routine activities associated with a CPA or WPA proposed action on endangered/threatened and nonendangered/nonthreatened coastal and marine birds are expected to be sublethal. These impacts include behavioral effects, exposure to or intake of OCS-related contaminants or discarded debris, temporary disturbances, and displacement of localized groups from impacted habitats. Impacts from potential oil spills associated with a proposed action and oil-spill cleanup on birds are expected to be negligible; however, small amounts of oil can affect birds and there are possible delayed impacts on their food supply. The effect of cumulative activities on coastal and marine birds is expected to result in a discernible decline in the numbers of birds that form localized flocks or populations, with associated changes in species composition and distribution. The incremental contribution of a CPA or WPA proposed action to cumulative impacts is expected to be negligible because it would not seriously alter species composition and cause major reductions in the overall carrying capacity of disturbed areas.

4.1.9.1. Description of the Affected Environment

Nonendangered and Nonthreatened Species

A detailed description of bird species, colonial breeding, and foraging habits of nonendangered and nonthreatened coastal and marine birds can be found in Chapter 3.2.6.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

The Gulf of Mexico is populated by both resident and migratory species of coastal and marine birds. They are herein separated into six major groups: diving birds, gulls/terns, shorebirds, passerines, wading birds, and waterfowl. Many species are mostly pelagic and, therefore, are rarely sighted nearshore. The remaining species are found within coastal and inshore habitats and are more susceptible to potential deleterious effects resulting from OCS-related activities (Clapp et al., 1982). Previous surveys indicate that Louisiana and Texas are among the primary states in the southern and southeastern U.S. for nesting colony sites and total number of nesting coastal and marine birds (Martin and Lester, 1991; Martin, 1991). Fidelity to these nesting sites varies from year to year along the Gulf Coast. Site abandonment along the northern Gulf Coast has often been attributed to habitat alteration and excessive human disturbance (Martin and Lester, 1991).

Diving birds are a diverse group. There are three main groups of diving birds: cormorants and anhingas (Pelecaniformes), loons (Gaviiformes), and grebes (Podicipediformes). Nesting diving birds in the Gulf include cormorants. Gulls, terns, noddies, jaegers, and black skimmers make up the gull/tern group. Of these, colonies of laughing gulls, eight species of terns, and black skimmers nest along the Gulf Coast (Martin and Lester, 1991; Pashley, 1991). Use of the 181 South Area by breeding or nonbreeding seabirds is unknown.

The small size of terns is a factor in their vulnerability to OCS-related activities and their general ecology. Terns are usually smaller than gulls, and tern refugees from colonies destroyed by humans may not be able to recolonize next to large gull colonies that are restricted to the same marsh and other such coastal habitats. Predation on tern eggs and chicks by the gulls is then often massive (Anderson and Devlin, 1999). Terns are smaller than other fish-eating seabirds and, hence, may be excluded from optimum feeding grounds by interference competition including food stealing (kleptoparasitisim) (Ballance et al., 1997). However, for seabirds with similar wing feather patterns, smaller birds like terns have more flight power and can fly farther (e.g., maximum foraging radius for breeding sooty terns is about 460 mi or 740 km; Flint, 1991) to search successfully for schools of prey that are suboptimal because they take longer to locate (Ballance et al., 1997).

Shorebirds are those members of the order Charadriiformes generally restricted to coastline and inland water margins (e.g., beaches, mudflats, etc.). The Gulf of Mexico shorebirds comprise five taxonomic families: Jacanidae (jacanas), Haematopodidae (oystercatchers), Recurvirostridae (stilts and avocets), Charadriidae (plovers), and Scolopacidae (sandpipers, snipes, and allies) (Hayman et al., 1986). All of the shorebirds are solitary nesters. An important characteristic of almost all shorebird species is their strongly developed migratory behavior, with some shorebirds migrating from nesting places in the high Arctic tundra to the southern part of South America (Terres, 1991). Both spring and fall migrations take place in a series of "hops" to staging areas where birds spend time feeding heavily to store up fat for the sustained flight to the next staging area; many coastal habitats along the Gulf of Mexico are critical for such purposes. Along the central Gulf Coast, 44 species of shorebirds have been recorded; only 6 nest in the area, and the remaining are wintering residents and/or staging migrants (Pashley, 1991).

Many of the overwintering shorebird species remain within specific areas throughout the season and exhibit between-year wintering site tenacity, at least when not disturbed by humans. Birds are aerodynamically constrained to use more energy to initiate movement (take off) than most other vertebrates (Attenborough and Salisbury, 1998). They may prefer to stay in one place. These species may be especially susceptible to localized impacts resulting in habitat loss or degradation unless they move to more favorable habitats when disturbed by man. The diversity of feeding methods may increase the ability of shorebirds to find new foraging habitat if human activities force them to leave their usual habitat.

Passerine birds mostly migrate across the Gulf of Mexico each fall and spring and are protected, along with other migrants, under the Migratory Bird Treaty Act. A recent study of platforms as possible resting sites for birds crossing the Gulf was completed and is summarized in Chapter 3.2.6.1 of the Multisale EIS. The 181 South Area is farther offshore than the area covered by that platform study. Therefore, the potential effect of platforms in the 181 South Area on trans-Gulf migrants is unknown.

Collectively, the following families of wading birds have representatives in the northern Gulf that are adapted to shallow water: Ardeidae (herons and egrets), Ciconiidae (storks), Threskiornithidae (ibises and spoonbills), and Gruidae (cranes). Common wading birds in the northern Gulf of Mexico, as well as their main features, are listed in Table 3-8 of the Multisale EIS. Seventeen species of wading birds in the Order Ciconiiformes are currently known to nest in the U.S., and all except the wood stork nest in the northern Gulf coastal region (Martin, 1991). Within the central Gulf Coast region, Louisiana supports the majority of nesting wading birds. Great egrets are the most widespread nesting species in the central Gulf Coast region (Martin, 1991), while little blue herons, snowy egrets, and tricolored herons constitute the greatest number of coastal nesting pairs in the western Gulf Coast (Texas Parks and Wildlife Department, 1990). The term "marsh bird" is a general term for a bird that lives in or around marshes and swamps. Members of the Rallidae family (rails, including moorhens, gallinules, and coots) have compact bodies; therefore, they are labeled marsh birds and not wading birds. They are also elusive and rarely seen within the low vegetation of fresh and saline marshes, swamps, and rice fields, where they walk on long toes (Bent, 1926; National Geographic Society, 1983; Ripley and Beehler, 1985).

Waterfowl belong to the taxonomic order Anseriformes and include swans, geese, and ducks. A total of 33 species are regularly reported along the north-central and western Gulf Coast. Common waterfowl in the northern Gulf of Mexico, as well as their main features, are also listed in Table 3-8 of the Multisale EIS. Many species usually migrate from wintering grounds along the Gulf Coast to summer nesting grounds in the north. Waterfowl migration pathways have traditionally been divided into four parallel north-south paths, or "flyways," across the North American continent. The Gulf Coast serves as the southern terminus of both Central (Texas) and Mississippi (Louisiana, Mississippi, and Alabama) flyways. Waterfowl are highly social and possess a diverse array of feeding adaptations related to their habitat (Johnsgard, 1975).

Endangered and Threatened Species

A detailed description of endangered and threatened coastal and marine bird species can be found in Chapter 3.2.6.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

The Multisale EIS included the bald eagle in the discussion of the endangered and threatened species. However, on June 28, 2007, FWS announced the removal of the bald eagle from the list of threatened and endangered species (USDOI, FWS, 2007b). The FWS will work with State wildlife agencies to monitor bald eagles for at least 5 years. The FWS can propose to relist the species if it appears that bald eagles again need the protection of the Endangered Species Act. The bald eagle will continue to be protected by the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. Both Federal laws prohibit "taking" (i.e., killing, selling, or otherwise harming eagles, their nests, or eggs).

The following coastal and marine bird species that inhabit or frequent the north-central and western Gulf of Mexico coastal areas are recognized by FWS as either endangered or threatened: piping plover, whooping crane, and brown pelican. None of them are expected to occur in the 181 South Area.

Piping Plover

The piping plover is listed as endangered on its Great Lakes breeding grounds. It is listed as threatened in the Gulf of Mexico and the rest of its wintering and breeding range. The piping plover (*Charadrius melodus*) is a migratory shorebird that is endemic to North America. The piping plover breeds along shorelines in the northern Great Plains, the Great Lakes, and along the Atlantic Coast (Newfoundland to North Carolina). It winters on the Atlantic and Gulf Coasts from North Carolina to Mexico and in the Bahamas West Indies, and it begins arriving on the wintering grounds in July and keeps arriving through September. The habitats used by wintering birds include beaches, mud flats, sand flats, algal flats, and washover passes (areas where breaks in the sand dunes result in an inlet). Wintering plovers are dependent on a mosaic of habitat patches and move among these patches depending on local weather and tidal conditions. Critical wintering habitat includes the land between mean lower low water and any densely vegetated habitat (not used by the piping plover). It has been hypothesized that specific wintering habitat, which includes coastal sand flats and mud flats in close proximity to large inlets or passes, may attract the largest concentrations of piping plovers because of a preferred prey base and/or because the substrate color provides protection from aerial predators due to cryptic blending camouflage color (Nicholls and Baldassarre, 1990). In late February, piping plovers begin leaving the wintering grounds to migrate back to their breeding sites. Northward migration peaks in late March, and by late May most birds have left the wintering grounds. Vegetation imposes an extreme threat of predators on breeding adults. On the northern breeding grounds, river alteration and reservoir creation cause high water flow where birds once relied on exposed sand bars to breed. However, diversion of peak flows in northern nesting habitat is also harmful. The result is the encroachment of vegetation that is usually kept under control by scour during high river flows. The migration of the piping plover is poorly understood.

This species remains in a precarious state given its low population numbers, sparse distribution, and continued threats to habitat throughout its range. About 2,299 birds were located on the U.S. wintering grounds during the 2001 census (Haig and Ferland, 2002). Although the results of the 2006 International Census have not yet been published, during that census, 226 piping plovers were counted at 26 sites along ~125 mi (200 km) of shoreline in Louisiana (Smith, personal communication, 2007). The final rule on the critical habitat of piping plover was published July 10, 2001; there are 20 critical habitat units in western Florida south to Tampa Bay, 3 areas in Alabama, 15 in Mississippi, 7 in Louisiana, and 37 in Texas (*Federal Register*, 2001). The highest numbers of wintering plovers occurred along the Texas coast (43.6%), with Louisiana ranked second (21.4%). Piping plovers were commonly found on mud flats (36.3%), sandy beaches (33.2%), and sand/salt flats (23.1%) (Haig and Ferland, 2002).

Whooping Crane

The whooping crane (*Grus americana*) is an omnivorous, wading bird. Whooping cranes currently exist in three wild populations and at five captive locations (USDOI, FWS, 1994). All of the populations are listed as endangered. The only self-sustaining wild population nests in the Northwest Territories and adjacent areas of Alberta, Canada, primarily within the boundaries of Wood Buffalo National Park. These birds winter in coastal marshes and estuarine habitats along the Gulf Coast in the Aransas National Wildlife Refuge in Texas, and they represent the majority of the world's population of free-ranging whooping cranes. Another wild flock was created with the transfer of wild whooping crane eggs from nests in the Wood Buffalo National Park to be reared by wild sandhill cranes in an effort to establish a migratory Rocky Mountains Population (USDOI, FWS, 1994). This population summers in Idaho, western Wyoming, and southwestern Montana, and it winters in the middle Rio Grande Valley, New Mexico. The third wild population is the first step in an effort to establish a nonmigratory population in

Florida (USDOI, FWS, 1994). The 2007 wild populations were estimated to total 355; the captive population contained 148 birds (Stehn, 2007).Brown Pelican

Brown Pelican

The population of brown pelicans and their habitat in Alabama, Florida, Georgia, North and South Carolina, and points northward along the Atlantic Coast were removed from the endangered species list in 1985; however, within the remainder of the range, which includes coastal areas of Texas, Louisiana, and Mississippi, where populations are not secure, the brown pelican remains listed as endangered (*Federal Register*, 1985). The brown pelican (*Pelicanus occidentalis*) is one of two pelican species in North America. It feeds entirely upon fishes captured in coastal waters. Organochlorine pesticide pollution apparently contributed to the endangerment of the brown pelican. Organochlorines like DDT accumulate up the food web and reach their highest concentrations in predators such as the brown pelican. The pesticides interfere with calcium metabolism, causing reduced calcification of egg shells, and potentially allowing the eggs to be crushed under the weight of an incubating parent. In recent years, there has been a marked increase in brown pelican populations within the former range of the species. In 2004, 16,501 nesting pairs produced an all-time high of 39,021 fledglings. Production decreased 35.2 percent in 2005 to 25,289 fledglings as a result of an oil spill at the West Breton Island colony caused by Tropical Storm Arlene and by the cumulative effects of Hurricanes Cindy, Dennis, Emily, Katrina, and Rita. Ninety-five percent of production occurred west of the Mississippi River. Young brown pelicans there had reached flight stage at the time of Hurricane Katrina with no direct mortality at colonies. Conversely, brown pelicans incubating eggs and caring for 5- to 6-week-old young east of the Mississippi River when Hurricane Katrina struck were impacted as eggs and young were washed away. Colonies there were repeatedly flooded by Tropical Storm Arlene and the hurricanes, causing fledgling mortality. In addition, Hurricane Ivan in 2004 and Hurricanes Katrina and Rita in 2005 caused catastrophic destruction of barrier islands and brown pelican nesting colonies. Hurricane Katrina reduced the size of the Chandeleur Islands by 90 percent and completely washed away West Breton Island, Mitchell Island, and Grassy Island (HuntnFish.com, 2007). Other major causes of the decline of the brown pelican are colony site erosion, disease, and human disturbance (Boggs, written communication, 2007). The Louisiana Dept. of Wildlife and Fisheries submitted a request in March 1994 to FWS to officially remove the eastern brown pelican from the endangered species list in Louisiana (Louisiana Dept. of Wildlife and Fisheries, 1994).

Effects of Hurricanes Katrina and Rita

Hurricanes Katrina and Rita have impacted avian habitats throughout the Gulf. Large areas of coastal wetlands have been converted to open-water habitat, potentially affecting avian species that used the wetlands for foraging, nesting, and as stopover points during migration (Gabe et al., 2005). A detailed summary of impacts of the hurricanes on birds is provided in Chapter 3.2.6 of the Multisale EIS.

New Information

A search was conducted for new information published since completion of the Multisale EIS. A search of Internet bibliographic databases, as well as personal interviews with authors of references used in the Multisale EIS, was conducted to determine the availability of recent information since publication of the Multisale EIS. The Internet databases examined included Google (2007a and b) and OCLC FirstSearch (2007). No new information on the description of bird resources was found from these information sources.

4.1.9.2. Impacts of Routine Events

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA or WPA proposed action on coastal and marine birds can be found in Chapters 4.2.2.1.8 and Chapter 4.2.1.1.7 of the Multisale EIS, respectively. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

This section discusses the possible effects of routine activities on coastal and marine birds of the Gulf of Mexico and its contiguous waters and wetlands. Federally listed endangered or threatened bird species are included in this discussion with non-listed bird species because the potential impacts are the same or very similar. Major, potential impact-producing factors for marine birds in the offshore environment include OCS-related helicopter and service-vessel traffic and noise, air emissions, degradation of water quality, habitat degradation, discarded trash and debris from service-vessels and OCS structures, and structure lighting and presence. Any effects on birds are especially grave for intensively managed populations. For example, endangered and threatened species may be harmed by any impact on viable reproductive population size or disturbance of a few key habitat factors.

The degree of disturbance of air or vessel traffic to birds varies. Behavior may temporarily halt or birds may be permanently displaced. Breeding may be interrupted without mortality, but it is ecologically vital to birds even so. Breeding birds become habituated to noise and the presence of humans (Nisbet, 2000). Aircraft may be forced to fly below legal minimum altitudes in inclement weather, possibly disturbing birds.

Air pollution may cause physiological impairment and provoke other diseases. Effects vary from lethal to sublethal and from short term to long term. Nonpolar, hydrophobic pollutants become a special problem for long-distance migrant birds that rely on fat deposits for extra energy requirements. More fat will hold more of that kind of pollutant. Migrants are generally sensitive to airborne toxins because of sustained high ventilation rates required for flight. Indirect effects of air emissions include adverse synergistic effects with other stresses and shifts in food supplies. Acid deposition affects the forest forging habitat of birds. Air emissions may cause changes in bird distribution and abundance, but the emissions must be diagnostically separated from other possible factors (e.g., weather and food supplies) that could have the same effect.

The impacts of discharges into water vary from short term to long term and from sublethal to lethal. Impacts may be from ingestion or contact (direct) or from the destruction of food supplies (indirect). Discharges may affect the breeding success of seabird nesting colonies prevalent along the shores of the northern Gulf of Mexico. Maintenance dredging and resuspension of sediment in canals and navigation channels increases turbidity over time. Birds feeding in such waters would experience chronic, sublethal impacts.

Habitat can be described as the physical environment and as the plant substrates used by a bird. Birds select their habitat at various times in their life histories according to their needs. The greatest negative impact to coastal and marine birds is the loss or degradation of preferred or critical habitat and, for a threatened or endangered species, this may result in global extinction. This discussion applies to both federally listed endangered/threatened bird species and non-listed species, since the effects are the same or very similar. The extent of bird displacement resulting from habitat loss is highly variable between different species, based upon specific habitat requirements, which for most species are not completely known. As displaced birds move to undisturbed areas of similar habitat, their presence may augment habitat utilization pressure on these selected areas as a result of intra- and interspecific competition for space or food.

Pipeline landfalls and terminals, and other onshore OCS-related construction, can destroy wetland bird habitat and can displace birds. Seabird nesting colonies are especially sensitive and should always be avoided by construction activities. Environmental regulations require replanting and restoration of wetlands destroyed by pipelaying barges and associated onshore pipeline installation. However, onshore pipelines cross a wide variety of coastal environments and can therefore affect certain species generally not associated with freshwater, marine, or estuarine systems. The northern Gulf of Mexico and areas inland from it have a large diversity of habitats for birds of all types, including migrants, wintering birds, and breeding birds.

Seabirds ingest plastic particles and other marine debris more frequently than do any other taxon (Ryan, 1990). Interaction with plastic materials may lead to permanent injuries and death. The effects of plastic ingestion may last a lifetime and may include physical deterioration due to malnutrition; plastics often cause a distention of the stomach, thus preventing its contraction and simulating a sense of satiation (Ryan, 1988). The chemical toxicity of some plastics can be high, posing a hazard in addition to obstruction and impaction of the gut (Fry et al., 1987). Some birds also feed plastic debris to their young, which could reduce survival rates and breeding success. As a result of stress from the consumption of debris, individuals may weaken, facilitating infection and disease; migratory species may then not have the strength to reach their destination.

CPA Proposed Action Analysis

The transportation or exchange of supplies, materials, and personnel between coastal infrastructure and offshore oil and gas structures is accomplished with helicopters, aircraft, boats, and a variety of service vessels (**Table 3-2**). It is projected that 1,004,000-2,241,000 helicopter operations related to a CPA proposed action would occur over the life of a proposed action; this is a rate of 25,100-56,025 annual helicopter operations. Service vessels would use selected nearshore and coastal (inland) navigation waterways, or corridors, and adhere to protocol set forth by the USCG for reduced vessel speeds within these inland areas. It is projected that 119,000-241,000 service-vessel round trips related to a CPA proposed action would occur over the life of a proposed action; this is a rate of 2,925-6,025 service-vessels trips annually.

Disturbances from OCS-related helicopter or service-vessel traffic to coastal birds can result from the mechanical noise or physical presence (or wake) of the vehicle. This discussion applies to both federally listed endangered/threatened bird species and non-listed species since the effects are the same or very similar. Disturbance to seabirds in the 181 South Area will be similar to the disturbance to birds in the other offshore waters of a proposed action.

The FAA and corporate helicopter policy advise helicopters to maintain a minimum altitude of 700 ft (213 m) while in transit offshore and 500 ft (152 m) while working between platforms. When flying over land, the specified minimum altitude is 1,000 ft (305 m) over unpopulated areas or across coastlines and 2,000 ft (610 m) over populated areas and biologically sensitive areas such as wildlife refuges and national parks. Many undisturbed coastal areas and refuges provide preferred and/or critical habitat for feeding, resting (or staging), and nesting birds. Birds can lose eggs and young when predators attack nests after parents are flushed into flight by service-vessel noise. Overall breeding success (ratio of fledged birds per nest to hatched birds per nest) may be reduced. Chronic effects on breeding are especially serious for endangered or threatened species because subsequent recovery may not occur. Routine presence and low speeds of service vessels within inland and coastal waterways would diminish the effects of disturbance from service vessels on nearshore and inland populations of coastal and marine birds.

Contamination of wildlife by air emissions can occur in three ways: inhalation, absorption, and ingestion. Inhalation is the most common mode of contamination for birds (Newman, 1980). Levels of sulfur oxide (mainly sulfur dioxide, SO_2) emissions from hydrocarbon combustion from OCS-related activities are of concern in relation to birds.

The indirect effects of air emissions on wildlife include food web contamination and habitat degradation, as well as adverse synergistic effects of air emissions with natural and other manmade stresses. Air pollutants may cause a change in the distribution of certain bird species (e.g., Newman, 1977; Llacuna et al., 1993).

Chapter 4.1.1.2 provides an analysis of the routine effects of a CPA proposed action on air quality. Emissions of pollutants into the atmosphere from the activities associated with a proposed action would have minimum effects on offshore and onshore air quality because of the prevailing atmospheric conditions, emission heights and rates, and pollutant concentrations. The NAAQS concentrations are far below concentrations that could harm coastal and marine birds. The most likely pathway for air pollution to affect birds is through acidification of inland waterbodies and soils, and a subsequent change in trophic structure (Environmental Science and Research, 1998).

Chapter 4.1.2 provides an analysis of the effects of a CPA proposed action on water quality. This discussion applies to both federally listed endangered/threatened bird species and non-listed species since the effects are the same or very similar. Expected degradation of coastal and estuarine water quality resulting from OCS-related discharges may affect coastal birds directly by means of acute or chronic toxic effects from ingestion or contact, or indirectly through the contamination of food sources. Operational discharges or runoff in the offshore environment could also affect seabirds (e.g., laughing gulls) that remain and feed in the vicinity of offshore OCS structures and platforms. Disturbance to seabirds in the 181 South Area will be similar to disturbance to the birds in the other offshore areas of a proposed action. These impacts could also be both direct and indirect. Many seabirds feed and nest in the Gulf; therefore, water quality may also affect breeding success (measured as the ratio of fledged birds per nest to hatched birds per nest).

The analysis of the potential impacts to coastal environments (**Chapter 4.1.3**) concludes that a CPA proposed action is not expected to adversely alter barrier beach configurations significantly beyond existing, ongoing impacts in very localized areas downdrift of artificially jettied and maintained channels. Adverse impacts of pipeline and navigation canals are the most significant OCS-related and proposed-action-related impacts to wetlands. Initial impacts are locally significant and largely limited to where OCS-related canals and channels pass through wetlands. For a CPA proposed action, 0-1 new pipeline landfalls (Chapter 4.1.2.1.7 of the Multisale EIS) and 0-1 new gas processing plants (Chapter 4.1.2.1.4.2 of the Multisale EIS) are projected.

Coastal and marine birds are susceptible to entanglement in floating, submerged, and beached marine debris; specifically in plastics discarded from both offshore sources and land-derived litter and waste disposal (Heneman and the Center for Environmental Education, 1988). This discussion applies to both federally listed endangered/threatened bird species and non-listed species since the effects are the same or very similar. It is expected that coastal and marine birds will seldom become entangled in or ingest OCS-related trash and debris as a result of MMS prohibitions on the disposal of equipment, containers, and other materials into offshore waters by lessees (30 CFR 250.40). In addition, MARPOL, Annex V, Public Law 100-220 (101 Statute 1458), which prohibits the disposal of any plastics, garbage, and other solid wastes at sea or in coastal waters, went into effect January 1, 1989, and is enforced by the USCG.

Every spring, migratory land birds, including neotropical passerines that cannot feed at the water surface or rest there, cross the Gulf of Mexico from wintering grounds in Latin America to breeding grounds north of the Gulf of Mexico. Some birds use offshore platforms as stopover sites for this migration; this may enhance fitness. This discussion applies to both federally listed endangered/threatened bird species and non-listed species since the effects are the same or very similar.

Migrants sometimes arrive at certain platforms shortly after nightfall or later and proceed to circle those platforms (the phenomenon is called a nocturnal circulation event) for variable periods ranging from minutes to hours. Russell (2005) notes that "because of the anecdotal nature of our circulation observations, we are reluctant even to speculate about the average duration of participation in circulation or the typical energetic consequences of participating in these events." The maximum observed number of birds participating in these circulations at one time at one platform was measured at 1,260 individuals. Nocturnal circulation events were only recorded 73 times and on only five of the nine platforms studied in the spring of 2000. No nocturnal circulation was recorded for the other four platforms. In some of the recorded events, only one bird was observed (Russell, 2005). More than 100 circulating birds were recorded for 18 of the 73 events. Circulations increase the risks for birds to collide with platform structures and with each other. Starving, exhausted, circulating birds may land on the platforms. Birds that dropped out of nocturnal circulations sometimes became trapped in well-lit interior areas of platforms and these birds appeared sublethally stressed (Russell, 2005). However, a total of 140 birds on the nine platforms were recorded as dead because of starvation for the entire spring of 2000 study period (Russell, 2005).

Platforms appeared to be suitable stopover habitats for most species, and most of the migrants that stopped over on platforms probably benefited from their stay, particularly in spring (Russell, 2005). Many of these migrants were able to feed successfully, and some appeared to achieve rates of mass gain that exceeded what is typical in terrestrial habitats. Even the individuals that do not feed probably benefit physiologically from the availability of the platforms. Migrants may be affected by sources of fatigue other than total depletion of fat stores, such as excessive accumulation of lactic acid, failure of the nerve-muscle junction, or the upset of central nervous coordination. These types of fatigue may be eliminated by simple rest. Many of the migrants that rested quietly on the platforms for hours to days were probably recovering from such sources of fatigue.

It is projected that 28-40 platforms are projected to be installed as a result of a CPA proposed action. Nocturnal circulation on these platforms is expected to have minimal and mostly sublethal impacts on migrating bird populations. This conclusion results from the confirmed low mortality from starvation for all birds that landed on the platforms examined by Russell (2005) and from the suggested sublethal stress in birds that dropped out of circulation observed on the platforms by Russell (2005). The advantage of stopovers is expected to make up for any losses to bird populations from the nocturnal circulations.

WPA Proposed Action Analysis

The transportation or exchange of supplies, materials, and personnel between coastal infrastructure and offshore oil and gas structures is accomplished with helicopters, aircraft, boats, and a variety of service vessels (**Table 3-3**). It is projected that 400,000-900,000 helicopter operations related to a WPA proposed action would occur over the life of a proposed action; this is a rate of 10,000-22,500 annual helicopter operations. Service vessels would use selected nearshore and coastal (inland) navigation waterways, or corridors, and adhere to protocol set forth by the USCG for reduced vessel speeds within these inland areas. It is projected that 94,000-155,000 service-vessel round trips related to a WPA proposed action would occur in the life of a proposed action; this is a rate of 2,350-3,875 service-vessels trips annually.

Disturbances from OCS-related helicopter or service-vessel traffic to coastal birds can result from the mechanical noise or physical presence (or wake) of the vehicle. This discussion applies to both federally listed endangered/threatened bird species and non-listed species since the effects are the same or very similar.

The FAA and corporate helicopter policy advise helicopters to maintain a minimum altitude of 700 ft (213 m) while in transit offshore and 500 ft (152 m) while working between platforms. When flying over land, the specified minimum altitude is 1,000 ft (305 m) over unpopulated areas or across coastlines and 2,000 ft (610 m) over populated areas and biologically sensitive areas such as wildlife refuges and national parks. Many undisturbed coastal areas and refuges provide preferred and/or critical habitat for feeding, resting (or staging), and nesting birds. Birds can lose eggs and young when predators attack nests after parents are flushed into flight by service-vessel noise. Overall breeding success (ratio of fledged birds per nest to hatched birds per nest) may be reduced. Chronic effects on breeding are especially serious for endangered or threatened species because subsequent recovery may not occur. Routine presence and low speeds of service vessels within inland and coastal waterways would diminish the effects of disturbance from service vessels on nearshore and inland populations of coastal and marine birds.

Contamination of wildlife by air emissions can occur in three ways: inhalation, absorption, and ingestion. Inhalation is the most common mode of contamination for birds (Newman, 1980). Levels of sulfur oxide (mainly SO_2) emissions from hydrocarbon combustion from OCS-related activities are of concern in relation to birds.

The indirect effects of air emissions on wildlife include food web contamination and habitat degradation, as well as adverse synergistic effects of air emissions with natural and other manmade stresses. Air pollutants may cause a change in the distribution of certain bird species (e.g., Newman, 1977; Llacuna et al., 1993).

Chapter 4.1.1.2 provides an analysis of the routine effects of a WPA proposed action on air quality. Emissions of pollutants into the atmosphere from the activities associated with a proposed action would have minimum effects on offshore and onshore air quality because of the prevailing atmospheric conditions, emission heights and rates, and pollutant concentrations. The NAAQS concentrations are far below concentrations that could harm coastal and marine birds. The most likely pathway for air pollution to affect birds is through acidification of inland waterbodies and soils, and a subsequent change in trophic structure (Environmental Science and Research, 1998).

Chapter 4.1.2 provides an analysis of the effects of a WPA proposed action on water quality. This discussion applies to both federally listed endangered/threatened bird species and non-listed species since the effects are the same or very similar. Expected degradation of coastal and estuarine water quality resulting from of OCS-related discharges may affect coastal birds directly by means of acute or chronic toxic effects from ingestion or contact, or indirectly through the contamination of food sources. Operational discharges or runoff in the offshore environment could also affect seabirds (e.g., laughing gulls) that remain and feed in the vicinity of offshore OCS structures and platforms. Disturbance to seabirds in the 181 South Area will be similar to disturbance to the birds in the other offshore areas of the proposed action. These impacts could also be both direct and indirect. Many seabirds feed and nest in the Gulf; therefore, water quality may also affect breeding success (measured as the ratio of fledged birds per nest to hatched birds per nest).

The analysis of the potential impacts to coastal environments (**Chapter 4.1.3**) concludes that a WPA proposed action is not expected to adversely alter barrier beach configurations significantly beyond existing, ongoing impacts in very localized areas downdrift of artificially jettied and maintained channels. Adverse impacts of pipeline and navigation canals are the most significant OCS-related and proposed-action-related impacts to wetlands. Initial impacts are locally significant and largely limited to where OCS-related canals and channels pass through wetlands. For a WPA proposed action, 0-1 new pipeline landfalls (Chapter 4.1.2.1.7 of the Multisale EIS) and 0-1 new gas processing plants (Chapter 4.1.2.1.4.2 of the Multisale EIS) are projected.

Coastal and marine birds are susceptible to entanglement in floating, submerged, and beached marine debris; specifically in plastics discarded from both offshore sources and land-derived litter and waste disposal (Heneman and the Center for Environmental Education, 1988). This discussion applies to both federally listed endangered/threatened bird species and non-listed species since the effects are the same or very similar. It is expected that coastal and marine birds will seldom become entangled in or ingest OCS-related trash and debris as a result of MMS prohibitions on the disposal of equipment, containers, and other materials into offshore waters by lessees (30 CFR 250.40). In addition, MARPOL, Annex V, Public Law 100-220 (101 Statute 1458), which prohibits the disposal of any plastics, garbage, and other solid wastes at sea or in coastal waters, went into effect January 1, 1989, and is enforced by the USCG.

Every spring, migratory land birds, including neotropical passerines that cannot feed at the water surface or rest there, cross the Gulf of Mexico from wintering grounds in Latin America to breeding grounds north of the Gulf of Mexico. Some birds use offshore platforms as stopover sites for this migration; this may enhance fitness. This discussion applies to both federally listed endangered/threatened bird species and non-listed species since the effects are the same or very similar.

Migrants sometimes arrive at certain platforms shortly after nightfall or later and proceed to circle those platforms (the phenomenon is called a nocturnal circulation event) for variable periods ranging from minutes to hours. Russell (2005) notes that, "because of the anecdotal nature of our circulation observations, we are reluctant even to speculate about the average duration of participation in circulation or the typical energetic consequences of participating in these events." Circulations increase the risks for birds to collide with platform structures and with each other. Starving, exhausted, circulating birds may land on the platforms. Birds that dropped out of nocturnal circulations sometimes became trapped in well-lit interior areas of platforms, and these birds appeared sublethally stressed (Russell, 2005). However, a total of 140 birds on the nine platforms were recorded as dead because of starvation for the entire spring of 2000 study period (Russell, 2005). More detail is presented in Chapter 4.2.1.1.7 of the Multisale EIS. It is projected that 28-41 platforms are projected to be installed as a result of a WPA proposed action (**Table 3-3**). Nocturnal circulation on these platforms is expected to have minimal and mostly sublethal impacts on migrating bird populations. This conclusion results from the confirmed low mortality from starvation for all birds that landed on the platforms examined by Russell (2005) and from the suggested sublethal stress in birds that dropped out of circulation observed on the platforms by Russell (2005). The advantage of stopovers is expected to make up for any losses to bird populations from the nocturnal circulations.

Summary and Conclusion

The majority of effects resulting from a CPA or WPA proposed action on endangered/threatened and nonendangered/nonthreatened coastal and marine birds are expected to be sublethal. These effects include behavioral effects, exposure to or intake of OCS-related contaminants or discarded debris, temporary disturbances, and displacement of localized groups from impacted habitats. Chronic sublethal stress, however, is often undetectable in birds. As a result of stress, individuals may weaken, facilitating infection and disease; migratory species may then not have the strength to reach their destination. Nocturnal circulation around platforms may create acute sublethal stress from energy loss and increase the risks of collision, while stopovers on platforms would reduce energy loss. No significant habitat impacts are expected to occur directly from routine activities resulting from a CPA or WPA proposed action. Secondary impacts from pipeline and navigation canals to coastal habitats will occur over the long-term and may ultimately displace species. Disturbance to seabirds in the 181 South Area will be similar to disturbance to the birds in the other offshore waters of a proposed action.

4.1.9.3. Impacts of Accidental Events

Background/Introduction

A detailed description of accidental impacts to coastal and marine birds can be found in Chapter 4.4.8 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

This chapter discusses impacts to coastal and marine birds resulting from a CPA or WPA proposed action. Impact-producing factors include oil spills and oil-spill cleanup. Impact discussions are combined for threatened/endangered birds and nonthreatened/nonendangered birds because impacts of oil spills are similar for both.

Oil spills are the greatest potential direct and indirect impact to coastal and marine birds. Birds that are heavily oiled are usually killed. If the physical oiling of individuals or local groups of birds occurs, some degree of both acute and chronic physiological stress associated with direct and secondary uptake of oil would be expected. Small coastal spills, pipeline spills, and spills from accidents in navigated waterways can contact and affect the different groups of coastal and marine birds, most commonly marsh birds, waders, waterfowl, and certain shorebirds. Lightly oiled birds can sustain tissue and organ damage from oil ingested during feeding and grooming or from oil that is inhaled. Stress, trauma, and shock enhance the effects of exposure and poisoning. Low levels of oil could stress birds by interfering with food detection, feeding impulses, predator avoidance, territory definition, homing of migratory species, susceptibility to physiological disorders, disease resistance, growth rates, reproduction, and respiration. Reproductive success can be affected by the toxins in oil. Indirect effects occur by the fouling of nesting habitat and the displacement of individuals, breeding pairs, or populations to less favorable habitats. Competition may exclude refugee seabirds from habitats occupied by other seabirds.

New research, experience, and testing will help the efficacy of the rehabilitation of oiled birds and probably improve scare methods that will keep birds sway from an oil slick. Rehabilitation can be significant to the survival of threatened and endangered bird species.

Dispersants used in spill cleanup activity can have toxic effects similar to oil on the reproductive success of coastal and marine birds. The air, vehicle, and foot traffic that takes place during shoreline cleanup activity can disturb nesting populations and degrade or destroy habitat if not properly regulated.

A search was conducted for new information published since completion of the Multisale EIS. A search of Internet bibliographic databases, as well as personal interviews with authors of references used in the Multisale EIS, was conducted to determine the availability of recent information since publication of the Multisale EIS. The Internet databases examined included Google Advanced Book Search (2007a), Google Advanced Scholar Search (2007b), and OCLC FirstSearch (2007). Authors were contacted and interviewed to investigate any recent published data that may be available.

A literature search found Burger (1997), who reports that exposure to small amounts of oil, may weaken birds or decreases their body weight so they go for years without problems until they face a severe environmental stress. Then, they have a higher mortality than unexposed birds. Burger (1993) notes that spill volume has little or no correlation with bird mortality. However, Wilhelm et al. (2007) shows that this is no longer true when spill volume is scaled as the perimeter of the oil slick by putting a fractional exponent on spill volume. An estimated 10,000 seabirds were killed in a 1,000-bbl spill from the FPSO *Terra Nova* vessel off the Grand Banks of Newfoundland on November 21, 2002. No birds could be counted on the beach because winds blew out to sea, and no seabird data were available from before the spill. Even so, birds inside and outside the slick area were counted from a ship at sea while the slick was on the water. The density of seabirds in the affected area, wind conditions, wave action, and distance to the shore may have more effect than spill volume. Khan and Ryan (1991) note substantial mortality in seabirds after attempts at rehabilitation. Sublethal symptoms of contamination were numerous and substantial prior to the mortality. Similarly, numerous symptoms were found in dead birds on the shore and in birds dying after rehabilitation that were affected by the *Prestige* oil spill off the coast of Spain on November 19, 2002 (Balseiro et al., 2005). Final major impacts to European shags (*Phalacrocorax aristotelis*) from the *Prestige* spill probably came in 2003 from a decimated food supply of fish (Velando et al., 2005). As oil weathered, the exposure of seabirds to oil from the *Exxon Valdez* spill shifted from direct oiling to ingestion with food (Hartung, 1995).

Alonso-Alvarez et al. (2007a and b) used blood chemistry of yellow-legged gulls (*Larus michahellis*) to compare long-term sublethal toxicity of the *Prestige* oil spill with short-term experimental sublethal toxicity in captive birds fed small amounts of fuel oil. Long-term effects were measured about 19 months after the spill. Short-term effects were measured in captive birds fed a small amount of fuel oil for 7 days. Adults from oiled colonies and fuel-oil-fed experimental birds had higher total polycyclic aromatic hydrocarbons (TPAH) and lower levels of three natural metabolites. High levels of the enzymes aspartate transaminase (AST) and gamma-glutamate transaminase (GGT) indicate a possible liver problem. Adults from oiled colonies had higher levels of the enzyme (AST) than adults from unoiled colonies. The TPAH was positively correlated with AST and negatively correlated with body condition. Females from oiled colonies showed higher levels of GGT than females from unoiled colonies. In chicks captured 19 months after the spill, only hematocrit showed a possible impact (anemia) from the spill. The TPAH in chicks was positively correlated with hematocrit (ruling out an anemia problem from TPAH consumed in oiled colonies) and GGT (indicating a possible liver problem). Calcium was lower in oil-fed females than in control females but the same in oil-fed and control males. Calcium is important for sufficient egg shell thickness in breeding females.

Parsons (1994) provides the following unique before and after data for impacts of a spill on birds. Extensive shoreline and salt marsh were oiled by a January 1990 Exxon spill in the Arthur Kill and Kill van Kull estuaries of New York Harbor. Double-crested cormorants had reached their pre-spill population growth by 1991. Productivity of herring gulls remained unchanged by the spill. Most heron populations increased after the spill. Great black-backed gulls had a loss of abundance. Snowy egrets and glossy ibis used salt marsh and mud flat habitat, some of which was oiled. Black-crowned night heron and glossy ibis had delayed nesting after the spill and, along with snowy egret, showed lower reproductive success after the spill. Egg laying and hatching were generally more successful than chick-rearing because of the shortage of food fed to the chicks. Waterfowl were not affected seriously, except for a short-term decline in mallards.

New data does not conflict with data in the Multisale EIS and often is similar to or supports the data in the Multisale EIS.

CPA Proposed Action Analysis

The addition of the 181 South Area is not expected to change impacts to coastal and marine birds from the effects described in Chapter 4.4.8 of the Multisale EIS. As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. Activity that would result from the addition of the 181 South Area would cause a negligible increase in the risk of a large spill occurring and contacting coastal bird habitats. For a CPA proposed action including the 181 South Area over the life of the proposed action, the probabilities of oil spills occurring and contacting coastal bird habitat within 10 days are 17-27 percent for the threatened piping plover; <0.5 percent for the endangered whooping crane; 11-17 percent for the brown pelican; 3-4 percent for raptors; 20-30 percent for gulls, terns, and charadriid allies; 20-30 percent for shoreline charadriids; 11-16 percent for diving birds; 15-24 percent for wading birds; and 24-35 percent for waterfowl. All of these groups, except for the whooping crane, are widely distributed across the Gulf (Figures 4-22 through 4-31 in the Multisale EIS); therefore, an oil spill would only affect a small portion of a bird group. Given that, the combined probabilities are always less than 36 percent. Small coastal spills, pipeline spills, and spills from accidents in navigable waterways can contact and affect the different groups of coastal and marine birds, most commonly marsh birds, waders, waterfowl, and certain shorebirds. In the CPA, an estimated total of 46-102 coastal spills will occur over a 34-year production period. Impacts on seabirds at sea are not part of the analysis, and their seasonal distribution needs to be characterized. Many species breed outside the United States, sometimes outside the Northern Hemisphere. The whooping crane has a low probability of being impacted by an oil spill because of its limited range. Oil-spill cleanup is not expected to affect coastal birds if properly regulated. Impacts on all species are expected to be negligible.

WPA Proposed Action Analysis

The probabilities of oil spills occurring and contacting coastal bird habitat within 10 days as the result of a proposed action over its 40-year life are 7-11 percent for the threatened piping plover; 1 percent for the endangered whooping crane; 8-13 for the brown pelican; 8-13 percent for raptors; 8-14 percent for gulls, terns, and charadriid allies; 8-14 percent for shoreline charadriids; 8-13 percent for diving birds; 8-

14 percent for wading birds; and 9-14 percent for waterfowl. All of these groups, except for the whooping crane, are widely distributed across the Gulf (Figures 4-22 through 4-31 in the Multisale EIS); therefore, an oil spill would only affect a small portion of a bird group. Given that, the combined probabilities are always <15 percent. Small coastal spills, pipeline spills, and spills from accidents in navigable waterways can contact and affect the different groups of coastal and marine birds, most commonly marsh birds, waders, waterfowl, and certain shorebirds. In the WPA, an estimated total of 15-34 coastal spills will occur over a 34-year production period. Impacts on seabirds at sea are not part of the analysis and their seasonal distribution needs to be characterized. Many species breed outside the United States, sometimes outside the Northern Hemisphere. Impacts of a WPA proposed action on all coastal birds are expected to be negligible. Oil-spill cleanup is not expected to affect coastal birds if properly regulated.

Summary and Conclusion

Oil spills have the greatest impact on coastal and marine birds. Small amounts of oil can affect birds, and mortality from oil spills is often related to numerous symptoms of toxicity. Data from actual spills strongly suggest that impacts on their food supply are delayed after initial impacts from direct oiling. Mechanisms of toxic oil effects other than direct oiling of plumage have seldom been confirmed. The addition of the 181 South Area is not expected to change accidental impacts to coastal and marine birds presented in Chapter 4.4.8 of the Multisale EIS. Oil-spill impacts on birds from a CPA or WPA proposed action are expected to be negligible. Impacts of oil-spill cleanup from such a proposed action are also expected to be negligible.

4.1.9.4. Cumulative Impacts

Introduction/Background

A detailed description of cumulative impacts to coastal and marine birds can be found in Chapter 4.5.8 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

This cumulative analysis considers the effects of impact-producing factors related to the proposed actions; prior and future OCS sales; State oil and gas activity; crude oil imports by tanker; and other commercial, military, and recreational offshore and coastal activities that may occur and adversely affect populations of nonendangered/nonthreatened and endangered/threatened (listed) birds. Both listed and non-listed birds are discussed together because the impacts are similar.

The OCS-related, impact-producing factors include oil spills and any improperly regulated spill-response activities; habitat loss and modification resulting from coastal facility construction and development; OCS pipeline landfalls; aircraft and vessel traffic and noise, including OCS helicopter and service-vessels; structure lights and presence; air emissions; degradation of water quality; and trash and debris. Non-OCS, impact-producing factors include pollution of coastal waters resulting from municipal, industrial, and agricultural runoff and discharge; bird-watching activities; maintenance and use of navigation waterways; collisions of coastal and marine birds with structures such as power line towers; disease; storms and floods; coastal development; and fisheries interactions (negative impacts of decreased food resources by fisheries catch, and positive impacts of increased food resources from discarded bycatch).

Extent of Impacts

Activities considered under the cumulative scenario will detrimentally affect coastal and marine birds. The net effect of habitat loss from oil spills; habitat loss and modification resulting from coastal facility construction and development, as well as OCS pipeline landfalls; and maintenance and use of navigation waterways will alter species composition and reduce the overall carrying capacity of disturbed area(s) in general. These would be the most serious cumulative impacts on birds. It is expected that the majority of effects from the major impact-producing factors on coastal and marine birds are sublethal (i.e., behavioral effects from aircraft and vessel traffic and noise and bird-watching activities; and nonfatal exposure to or intake of trash, debris, and OCS-related contaminants from air emissions and degradation of water quality). Nocturnal circulation events at platforms are expected to have minimal and mostly sublethal impacts on migrating bird populations. Contaminants from non-OCS pollution of coastal waters resulting from municipal, industrial, and agricultural runoff and discharge may have acute or chronic, lethal or sublethal impacts. Behavioral impacts will usually cause temporary disturbances and displacement of inshore flocks. Collisions of coastal and marine birds with structures such as power line towers are usually lethal. Disease is often lethal but may be a part of natural avian population regulation. Storms and floods are natural disturbances to which exposed organisms are generally adapted. Fisheries catch may reduce population densities of avian aquatic predators limited by food availability by taking substantial food away. Substantially increased food resources from discarded fishery bycatch may have the opposite (positive) impact. Both processes are of special concern because fisheries are a recent unnatural intrusion into the function of coastal communities and organisms may not have had time to adapt.

The cumulative effect of programmatic activities on coastal and marine birds is expected to result in a small but discernible decline in the numbers of birds, with associated change in species composition and distribution. Some of these changes are expected to be permanent, as exemplified in historic census data, and to stem from a net decrease in preferred and/or critical habitat. However, the incremental contribution of a CPA or WAP proposed action to the cumulative impacts on coastal and marine birds is negligible because the effects of the most probable impacts, such as sale-related operational discharges and helicopters and service-vessel noise and traffic, are estimated to be sublethal, even though some displacement of local individuals or flocks may occur. It is expected that there will be little interaction between oil spills from a proposed action and coastal and marine birds.

A search was conducted for new information published since completion of the Multisale EIS. A search of Internet bibliographic databases, as well as personal interviews with authors of references used in the Multisale EIS, was conducted to determine the availability of recent information since publication of the Multisale EIS. The Internet databases examined included Google Advanced Book Search (2007a) and OCLC FirstSearch (2007). No new information was found from these information sources. No recent information was found that would necessitate a reanalysis of the impacts of a CPA or WPA proposed action upon coastal and marine birds. The analysis and potential impacts detailed in the Multisale EIS applies for this SEIS.

Summary and Conclusion

The cumulative effect on coastal and marine birds is expected to result in a discernible decline in the numbers of birds that form localized flocks or populations, with associated changes in species composition and distribution. Some of these changes are expected to be permanent, as exemplified in historic census data, and to stem from a net decrease in preferred habitat for all birds and critical habitat for endangered species. However, the increment increase of a CPA or WPA proposed action is expected to be negligible, even taking into account the relatively small addition of oil production from the 181 South Area to production for proposed actions analyzed in the Multisale EIS.

4.1.10. Endangered and Threatened Fish

4.1.10.1. Gulf Sturgeon

The MMS has reexamined the analysis for Gulf sturgeon presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for Gulf sturgeon presented in the Multisale EIS. The 181 South Area is nearly 130 mi (209 km) from the nearest coast, and it is not located within the designated critical habitat for Gulf sturgeon. It is extremely unlikely that there will be any sturgeon in the 181 South Area due to water depths that far exceed the recorded depths preferred by this sturgeon species. In addition, substrate type and the potential forage base associated with bottom types at these depths are not conducive for sustaining a Gulf sturgeon food base.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA proposed action, and a proposed action’s incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Routine activities in the CPA such as installation of pipelines, maintenance dredging, potential vessel strikes, and nonpoint-source runoff from onshore facilities would cause negligible impacts and will not deleteriously affect Gulf sturgeon. Indirect impacts from routine activities to inshore habitats are negligible and indistinguishable from direct impacts of inshore activities. The potential impacts from accidental events, mainly oil spills associated with a CPA proposed action, are anticipated to be minimal. Because of the floating nature of oil 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 a proposed action to the cumulative impacts to Gulf sturgeon is small, and it is expected to be negligible and indiscernible from impacts of inshore activities.

The Gulf sturgeon has been infrequently noted in some of the extreme easternmost portions of the WPA, but there has been no critical habitat designated west of the Mississippi River. Because of the infrequency of occurrence of Gulf sturgeon in the WPA, the following discussion of impacts to Gulf sturgeon is limited to the CPA.

4.1.10.1.1. Description of the Affected Environment

A detailed description of Gulf sturgeon can be found in Chapter 3.2.7.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

The NMFS and FWS listed the Gulf sturgeon (*Acipenser oxyrinchus desotoi)* as a threatened species on September 30, 1991. Critical habitat, designated on April 18, 2003, was defined as 14 geographic areas in the Gulf of Mexico's rivers and tributaries (**Figure 3-11**):

- Pearl and Bogue Chitto Rivers in Louisiana and Mississippi;
- Pascagoula, Leaf, Bowie (also referred to as Bouie), Big Black Creek, and Chickasawhay Rivers in Mississippi;
- Escambia, Conecuh, and Sepulga Rivers in Alabama and Florida;
- Yellow, Blackwater, and Shoal Rivers in Alabama and Florida;
- Choctawhatchee and Pea Rivers in Florida and Alabama;
- Apalachicola and Brothers Rivers in Florida; and
- Suwannee and Withlacoochee Rivers in Florida.

The critical habitat also includes portions of the following estuarine and marine areas:

- Lake Pontchartrain (east of the Lake Pontchartrain Causeway), Lake St. Catherine, Little Lake, The Rigolets, Lake Borgne, Pascagoula Bay, and Mississippi Sound systems in Louisiana and Mississippi, and sections of the adjacent State waters within the Gulf of Mexico;
- Pensacola Bay system in Florida;
- Santa Rosa Sound in Florida;
- nearshore Gulf of Mexico in Florida;
- Choctawhatchee Bay system in Florida;
- Apalachicola Bay system in Florida; and
- Suwannee Sound and adjacent State waters within the Gulf of Mexico in Florida.

The NMFS indicates that no changes in critical habitat have occurred and they are working to develop an estimate of sturgeon habitat loss and a habitat suitability index (HSI) for the species (Bolden, personal communication, 2007). They also have no data indicating that sturgeons are using the deeper Gulf waters. In general, the mud substrates found in the Gulf waters do not support the appropriate benthic food source for Gulf sturgeon.

The formal ESA consultation with NMFS was concluded with receipt of the BO on July 3, 2007 (USDOC, NMFS, 2007d). The BO concludes that the proposed actions would not adversely impact the endangered Gulf sturgeon or its critical habitat and that additional mitigative actions other than those already identified and in place would not be necessary

Additional research was conducted to investigate information that may be available since completion of the Multisale EIS. A search of Internet information sources, as well as personal interviews with personnel from State and Federal resource agencies, was conducted to determine the availability of recent information. Various Internet sources were examined to determine any recent information regarding Gulf sturgeon (Florida Fish and Wildlife Commission, 2007; USDOI, FWS, 2007b and c). No new information was found from these information sources. State and Federal resource agencies were contacted and interviews were conducted to investigate any recent published or unpublished data that may be available. Current information on the impacts of Hurricane Katrina indicates that there may have been some displacement of sturgeon or possibly damage to their habitat in localized areas where the storm forces were strongest. The current sampling programs along the coastal Gulf South indicate (at least anecdotally) that sturgeon are returning to the areas they occupied prior to the storm, which may indicate somewhat of a recovery of those areas (Paruka, personal communication, 2007a). No changes in migratory patterns or blockages of migratory pathways have been noted. In general, the researchers noted that the sturgeon are normally found approximately 0.5 mi (0.8 km) from shore between the shoreline and the barrier islands, with the bulk of the fish located in the CPA between Petit Bois, Dauphin, and Chandeleur Islands and from Perdido to Panama City, Florida, and as far as Fort Walton Beach (Slack, personal communication, 2007; Paruka, personal communication, 2007a). A Gulf sturgeon population census was conducted in the lower Escambia River from October 10 through November 5, 2006. This fish collection coincided with the sturgeons' fall migration from the freshwater to marine environment. This study collected 130 fish ranging in size from 1 to 145 pounds (lb) (0.5 to 66 kilograms (kg)). Large fish (>99 lb or 45 kg) accounted for 10 percent of the catch, which is less than in 2003 where the same class comprised 19 percent of the catch (Paruka, 2007b). The current Gulf sturgeon population estimate is 451 fish. The decrease from the estimated 554 fish in 2003 is probably due to hurricane-induced, degraded water quality. Hurricane Ivan caused massive fish kills in 2004.

A total of 17 Gulf sturgeons were collected in coastal Alabama waters from 2001 to 2007. Six of the 14 sturgeon were collected in Alabama coastal waters in 2006 (Metee and Rider, 2007). A 160-lb (73-kg) Gulf sturgeon was captured, tagged, and released in Mobile Bay near Fairhope Alabama in February 2006 and was later relocated in early 2007 near the Choctawhatchee River in 2007.

The Gulf sturgeon is anadromus, with immature and mature fish participating in freshwater migrations. Gill netting and biotelemetry have shown that subadults and adults spend 8-9 months each year in rivers and 3-4 of the coolest months in estuaries or Gulf waters. Subadult and adult Gulf sturgeon spend cool months (October or November through March or April) in estuarine areas, bays, or in the Gulf of Mexico (Odenkirk, 1989; Clugston et al., 1995). Adult Gulf sturgeon likely overwinter in the Gulf of Mexico, but this is currently unknown for the majority of the population.

Habitats used by Gulf sturgeon in the vicinity of the Mississippi Sound barrier islands tend to have a sand substrate and an average depth of 1.9-5.9 m (6.2-19.4 ft). Unvegetated estuary and bay habitats have a preponderance of sandy substrates that support burrowing crustaceans, which are known to be prey items. Studies along the Florida coast indicate that Gulf sturgeon use shoreline areas between 2 and 4 m (6.5 and 13.0 ft) deep characterized by low relief and sand substrate (Fox et al., 2002). These studies also noted the occasional use of depths deeper than 4 m (13 ft) but concluded that these deeper waters were used for movement between shoreline areas. Gulf sturgeon can move fairly long distances rapidly but the moves are generally localized and, in all cases, sturgeon return to the optimum preferred shallow depth. Foraging areas for the Gulf sturgeon in the open Gulf of Mexico is unknown. Using telemetry studies as a basis, it has been hypothesized that a small percentage of the Gulf sturgeon population monitored may use the open Gulf for foraging. This conclusion is based on the absence of tagged sturgeon (relocated to deeper offshore waters) not being present in the nearshore samples, therefore indicating that these fish did not return as others did to the nearshore waters (Paruka et al., 2001). Some adult Gulf sturgeon were noted to migrate >100 km (62 mi) into marine waters, although as previously noted the majority returned quickly to shallow water (Fox et al., 2002).

The evaluation of tagging data has identified several nearshore Gulf of Mexico feeding migrations but no offshore Gulf of Mexico feeding migrations. Telemetry data documented Gulf sturgeon from the Pearl River and Pascagoula River subpopulations migrating from their natal bay systems to Mississippi Sound and moving along the barrier islands on both the island passes (Ross et al., 2001). Based on recent population estimates for Pearl River drainage (Kirk and Rogillio, personal communication, 2007), the annual populations of sturgeon varied from the 1996 to 2005 period of record from an annual low of 222 fish to a high of 536 fish captured. The acceptable range for annual mortality required to sustain the population in the Pearl River System was estimated to be in the range of 16 to 24 percent mortality. There was insufficient captures post-Hurricane Katrina to obtain an actual population number; however, a mortality rate of 38 percent was estimated. Based on this estimate of mortality, there is insufficient recruitment to maintain the current Pearl River population. Estimated annual populations of Gulf sturgeon in the Pascagoula River system is approximately 234 with an annual fish count that ranged from 142 to 394 fish per year over a period of record from 1999 to 2000 (Slack, personal communication, 2001). Based on this conversation, the 2005 annual population estimate for the Pascagoula system is 210 fish.

Gulf sturgeons from the Choctawhatchee, Yellow, and Apalachicola Rivers have been documented migrating in the nearshore Gulf of Mexico waters between the Pensacola and Apalachicola Bay units (Fox et al., 2000). Telemetry data from the Gulf of Mexico mainly show sturgeon in depths of 6 m (19.8 ft) or less (Ross et al., 2001; Fox et al., 2000).

The historic range of the Gulf sturgeon included nine major rivers and several smaller rivers from the Mississippi River, Louisiana, to the Suwannee River, Florida, and the marine waters of the Central and Eastern Gulf of Mexico, south to Tampa Bay (Wooley and Crateau, 1985; USDOI, FWS, 1995). Its present range extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida. Sporadic occurrences have been recorded as far west as the Rio Grande River between Texas and Mexico, and as far east and south as Florida Bay (Wooley and Crateau, 1985; Reynolds, 1993).

Until recently only two spawning sites were known, both in the Suwannee River in Florida. Eggs have now been discovered in six locations within the Choctawhatchee River system in Florida and Alabama (Fox and Hightower, 1998). Although fry and juveniles feed in the riverine environment, subadults and adults do not (Mason and Clugston, 1993; Sulak and Clugston, 1999).

The offshore winter distribution of Gulf sturgeon relative to the location of the activities under the proposed action is unknown. However, there have been no reported catches of this species in Federal waters (Sulak, personal communication, 1997).

The decline of the Gulf sturgeon is believed to be due to overfishing and habitat destruction, primarily the damming of coastal rivers and the degradation of water quality (Barkuloo, 1988). In the late 19th century and early 20th century, the Gulf sturgeon supported an important commercial fishery, providing eggs for caviar, flesh for smoked fish, and swim bladders for isinglass, a gelatin used in food products and glues (Carr, 1983). Dams and sill construction mostly after 1950 restricted access to historic spawning areas (Wooley and Crateau, 1985), exacerbating habitat loss, and overfishing resulted in the decline of the Gulf sturgeon throughout most of the 20th century. In several rivers throughout its range, dams have severely restricted sturgeon access to historic migration routes and spawning areas. Dredging and other navigation maintenance, possibly including lowering of river elevations and elimination of deep holes and altered rock substrates, may have adversely affected Gulf sturgeon habitats (Wooley and Crateau, 1985). Contaminants, both agricultural and industrial, may also be a factor in their decline. Organochlorines have been documented to cause reproductive failure in the Gulf sturgeon, reduced survival of young, or physiological alterations in other fish (White et al., 1983). In addition, Gulf sturgeon appear to be natal spawners with little, if any, spawning from other riverine populations.

Today, the greatest habitat threat to sturgeon is the damming of coastal rivers. Sturgeon cannot pass through the lock and dam systems to reach spawning areas. Dredging, desnagging, and spoil deposition associated with channel maintenance and improvement also present a threat to sturgeon spawning habitat. Poor water quality because of pesticide runoff, heavy metals, and industrial contamination may be affecting sturgeon populations. Habitat loss continues to pose major threats to the recovery of the species.

Natural phenomenon such as tropical storms and hurricanes occur along the Gulf Coast with varying frequency and intensity between years. Although these are usually localized and sporadic, the 2004 and 2005 hurricane seasons brought major and repeated damage to the Gulf Coast area. The effects from

Hurricane Katrina (2005) are still being assessed. The impacted area included a large portion of the designated critical habitat and known locations of Gulf sturgeon. The sturgeons are upstream in freshwater riverine habitats during the tropical storm season. This may give the estuarine and marine areas time to recover from hurricane impacts before the sturgeon move downstream. For instance, massive runoff due to flooding rains and swollen tributaries could cause a sharp increase in toxic contaminants in estuarine habitats. However, spreading and dilution should mitigate any threat to sturgeon very quickly. By the time the downstream migration occurs, conditions should have returned to near normal. The flooding and subsequent "unwatering" of New Orleans in the fall of 2005 created concern for any sturgeon that might have been in the areas of Lake Pontchartrain, which is where those contaminated floodwaters were pumped. The COE noted in their environmental assessment that temporary impacts to Gulf sturgeon may have resulted as a part of the unwatering activities related to the pumping of floodwaters into Lake Pontchartrain. Impacts due to the quantity and quality of the floodwaters may have caused some sturgeon to seek forage and resting areas in other more undisturbed locations of Lake Pontchartrain. It was expected that any sturgeon displaced returned to the area once the unwatering activities ceased (USACE, 2005a). The COE also noted that the emergency procedures permitted in the Panama City, Florida, aftermath of Hurricane Ivan may have created temporary impacts to species, including the Gulf sturgeon, but the emergency procedures did not adversely impact the species (USACE, 2005b). After Hurricane Katrina, there were reports of fish kills and at least one confirmed report of a dead Gulf sturgeon due to low oxygen in the water from organic input from leaf litter and other sources such as raw sewage and untreated effluent (Cummins, 2005). Many municipalities or sources of discharges lost power and/or were flooded and were likely a source of contaminant discharge. The hurricane impacts have not yet been fully assessed for Gulf sturgeon but they are generally believed to be temporary (Baker, personal communication, 2006).

An unpredictable event that is currently having an affect on some of the Gulf sturgeon habitat in some of the Gulf States is the drought conditions along the upper portions of rivers feeding the lower riverine habitat for the species located in these coastal rivers. Recently, potential threats to the Gulf sturgeon habitat in the Apalachicola River system and the receiving bays have been raised as a consequence of reducing river flow to meet upstream water needs during drought conditions in upper Georgia (Picard, 2007).

4.1.10.1.2. Impacts of Routine Events

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA proposed action on Gulf sturgeon is presented in Chapter 4.2.2.1.9.1 of the Multisale EIS.

Designated Gulf sturgeon critical habitat occurs in estuarine and riverine locations along the Gulf Coast east of the Mississippi River in Louisiana, Mississippi, Alabama, and Florida (Chapter 3.2.7.1 of Multisale EIS). Critical habitat is defined as special geographic areas that are essential for the conservation of a threatened or endangered species and that may require special management and protection. Designated Gulf sturgeon critical habitat is confined to State waters. Most activities related to the CPA proposed action will occur in Federal waters (e.g., structure placement, drilling, removal, etc); however, critical habitat may be impacted directly or indirectly.

The Gulf sturgeon has been infrequently noted in some of the extreme easternmost portions of the WPA, but there has been no critical habitat designated west of the Mississippi River. Because of the infrequency of occurrence of Gulf sturgeon in the WPA, a discussion of impacts to Gulf sturgeon will be limited to the CPA.

The 181 South Area is nearly 130 mi (209 km) from the nearest coast, and it is not located within the designated critical habitat for Gulf sturgeon. It is also extremely unlikely that there will be any sturgeon in the 181 South Area due to water depths that far exceed the recorded depths shown as a preference by this sturgeon species. Substrate type and the potential forage base associated with bottom types at these depths are not conducive for sustaining a Gulf sturgeon food base.

CPA Proposed Action Analysis

The routine activities associated with a CPA proposed action that would impact Gulf sturgeon include installation of pipelines in coastal waters, maintenance dredging of navigational canals, potential for service vessel strikes, and nonpoint-source runoff from onshore facilities.

One to three new pipelines are projected to be installed in State waters as a result of a CPA proposed action. These new installations could temporarily increase the local total suspended solids in the water. The COE and State permits would require avoidance, minimization of impacts, and mitigation.

The Corps and State permits would also require using techniques that would minimize turbidity impacts and require the beneficial use of dredged material for wetlands restoration. Trenchless, or directional, drilling is a recent technique for pipeline installation that is used in sensitive habitats. Impacts from this technique are limited to the access and staging sites for the equipment, and Gulf sturgeon are expected to avoid lay-barge equipment as well as resuspended sediments.

Minor degradation of estuarine water quality is expected in the immediate vicinity of shore bases and other OCS-related facilities as a result of routine effluent discharges and runoff. Rapid dilution is expected to negate any impact to critical habitat or Gulf sturgeon from these sources. Offshore discharges of drilling muds and produced waters are expected to dilute to background levels within 1,000 m (3,281 ft) of the discharge point (CSA, 1997). In addition, sturgeons are not known to be attracted to petroleum structures or activity, which is where the discharges would be the most concentrated.

Service-vessel traffic running in and out of shore bases may create the potential for impact to Gulf sturgeon. However, due to the benthic nature of the sturgeon and their lack of attraction to dredging activity (Paruka, 2007c), it is doubtful that they would encounter a vessel strike. Recent studies have noted that freshwater sturgeon species respond to certain noise levels by moving from the bottom to varying distances up into the water column but still not to the depth that the fish would be susceptible to vessel strike (Hoover and Beard, 2007).

It is also highly unlikely that Gulf sturgeon would encounter any drilling muds or produced waters from the 181 South Area since this area is at least 100-130 mi (161-209 km) offshore from any critical habitat or known preferred coastal holding areas for Gulf sturgeon. The current critical habitat is in State waters, well inshore of the location of any oil or gas structure installed as a result of a CPA proposed action. In the very unlikely event that a Gulf sturgeon was far enough offshore to be in the area of an impending structure removal, the associated disturbance and activity is expected to deter the fish from approaching the removal site. Sturgeons generally remain in the estuarine regions near river mouths or in shallow Gulf waters.

Summary and Conclusion

Potential impacts on Gulf sturgeon and the designated critical habitat may occur from drilling and produced-water discharges, degradation of estuarine and marine water quality by nonpoint runoff from estuarine OCS-related facilities, vessel traffic, explosive removal of structures, and pipeline installation. The dilution and low toxicity of these discharges are expected to result in a negligible impact of a CPA proposed action on Gulf sturgeon. Vessel traffic will generally only pose a risk to Gulf sturgeon when leaving and returning to port. Major navigation channels are excluded from critical habitat. The Gulf sturgeon's characteristics of bottom-feeding and general avoidance of disturbance make the probability of vessel strike extremely remote. Explosive removal of structures as a result of a CPA proposed action will occur well offshore of Gulf sturgeon critical habitat and the riverine, estuarine, and shallow Gulf habitats where sturgeon are generally located. Environmental permit requirements and recent techniques for installing pipelines will result in very minimal impact to Gulf sturgeon critical habitat if any pipeline is installed nearshore due to a proposed action. Impacts from routine activities resulting from a CPA proposed action are expected to have negligible effects on Gulf sturgeon and their designated critical habitat.

4.1.10.1.3. Impacts of Accidental Events

Background/Introduction

A detailed description of accidental impacts upon Gulf sturgeon can be found in Chapter 4.4.9.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Accidental impacts associated with a CPA or WPA proposed action that could adversely affect Gulf sturgeon include oil spills associated with the transport and storage of oil (Chapter 4.3.1 of the Multisale EIS). The degree of impact from oil spills depends on the location of the spill, oil slick characteristics, water depth, currents, time of year, and weather. Offshore oil spills that occur in the proposed action areas are much less likely to contact the Gulf sturgeon or its critical habitat than are inshore spills because of the proximity of the spill to the critical habitat and known range of the sturgeon. Designated Gulf sturgeon critical habitat occurs in estuarine and riverine locations along the Gulf Coast east of the Mississippi River in Louisiana, Mississippi, Alabama, and Florida (Chapter 3.2.7.1 of the Multisale EIS) in the CPA. There is no critical habitat designated in the WPA and 181 South Area is totally within Federal waters approximately 130 mi (209 km) from the designated critical habitat. Designated Gulf sturgeon critical habitat is confined to State waters. Most activities related to a proposed action will occur in Federal waters; however, critical habitat may be impacted directly or indirectly. Gulf sturgeon are primarily benthic feeders and inhabit mostly nearshore, coastal water environments of moderate depth, except during the riverine spawning period. Based on current studies (Paruka, 2007b), the sturgeon seems to have preference for the nearshore waters and have not been tracked any farther seaward than the seaward side of the barrier islands. Based on information from NMFS (Bolden, personal communication, 2007), the muddy substrates found in deeper waters are not conducive for the sturgeons preferred benthic food base. It was noted that, throughout the many years that the offshore platforms have been monitored by remotely-operated vehicles (ROV's), divers and active sampling, there has been no observation of Gulf sturgeon (Randall, personal communication, 2007) in or around these offshore sites. In recent sturgeon studies on the Suwannee River in Florida, it was noted that the smaller fish generally remain more inland and in shallow water while the juveniles tend to come down river from the spawning grounds closer to the river mouth. Adults tend to use the river mouth and the surrounding bays, sometimes venturing out to the barrier islands (Sulak et al., 2007). The juveniles and subadults, at least seasonally in the nearshore coastal waters, could potentially be at risk from both coastal and offshore spills. Because of the floating nature of oil and the small tidal range in the coastal Gulf, oil spills alone would typically have very little impact on benthic feeders such as the Gulf sturgeon.

Due to the distance of the 181 South Area from the potential known locations and critical habitat, the oil from an offshore spill would be sufficiently weathered and its toxic components neutralized by the time it reached the areas used by sturgeon. There is a greater potential for sturgeon contact with nearshore spills as a result of a pipeline rupture or vessel collisions. Some significant effects on sturgeon from cleanup efforts could occur if dispersants are used in the nearshore environment. The use of oil dispersants increases the risk of impact with bottom-feeding and/or bottom-dwelling fauna. For this reason, dispersants are not expected to be used with coastal spills. The dispersant can consolidate and take the oil to the bottom. The higher spill potential would be along the Louisiana coast, but the winds, increased wave energy, and the outflow of the Mississippi River would assist in the dispersion of an offshore spill. 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.

CPA Proposed Action Analysis

Gulf sturgeon critical habitat is restricted to State waters east of the Mississippi River and primarily nearshore along river mouths and associated bays. The greatest threat to Gulf sturgeon would be from inland spills. Based on the assumption that spill occurrence is proportional to the volume of oil handled, sensitive coastal environments in eastern Louisiana, from Atchafalaya Bay to east of the Mississippi River, including Barataria Bay, have the greatest risk of being contacted by spills from operations related to a CPA proposed action.

Spills that could occur in coastal waters from support operations (supply vessels and transport) are estimated at 46-102 spills for a CPA proposed action over its 40-year life. Oil spills that occur offshore are much less likely to contact Gulf sturgeon or their critical habitat than are inshore spills. The probabilities of an offshore spill ≥1,000 bbl occurring and contacting environmental features are described in Chapter 4.3.1.8 of the Multisale EIS and **Chapter 3.2.1** of this SEIS. Eight parishes in Louisiana have a >0.5 percent chance of spill contact. For these parishes, the chance of an OCS offshore spill ≥1,000 bbl ranges from 1 to 16 percent. In Louisiana, the Deltaic Plain area has the highest risk of a spill ≥1,000 bbl occurring and contacting the coast as a result of a CPA proposed action (Chapter 4.3.1 of the Multisale EIS).

Figures 3-10 and 3-11 show the known locations of Gulf sturgeon and the location of Gulf sturgeon critical habitat. The probability of an offshore oil spill ≥1,000 bbl occurring and contacting the known locations of Gulf sturgeon is 6-10 percent as the result of a proposed action over its 40-year life. There is <0.5-1 percent probability of an offshore oil spill ≥1,000 bbl occurring and contacting the western portion of Gulf sturgeon critical habitat (Unit 8), with a <0.5 percent for the eastern critical habitat portion (Units 9-14). The risk of exposure of Gulf sturgeon to such a spill would be dependent on the species abundance and density, as well as the size and persistence of the slick.

As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. Activity that would result from the addition of the 181 South Area would cause a negligible increase in the risk of a large spill occurring and contacting known locations of Gulf sturgeon or critical habitat.

Due to the distance of the activity from shore and critical habitat, it is unlikely that offshore spills or effluents will impact sturgeon habitat. The dilution and low toxicity of this pollution is expected to result in a negligible impact of a CPA proposed action on Gulf sturgeon.

Summary and Conclusion

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. The likelihood of a spill of a size and duration to persist long enough in the environment to impact the sturgeon or the sturgeon's estuarine habitats is very small. Contact with oil spills could cause the fish to temporarily migrate from the affected area and could cause nonfatal irritation of gill epithelium and an increase of liver function in a few adults, which are nonlethal.

The NMFS Biological Opinion (USDOC, NMFS, 2007d) concurred with MMS that the proposed actions would not adversely impact the endangered Gulf sturgeon or its critical habitat. No additional mitigative actions, other than those already identified, would be necessary.

4.1.10.1.4. Cumulative Impacts

Background/Introduction

A detailed description of cumulative impacts upon Gulf sturgeon and its critical habitat can be found in Chapter 4.5.9 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS. This cumulative analysis summary considers activities that could occur and adversely affect Gulf sturgeon within its range and critical habitat in the northern Gulf of Mexico, east of the Mississippi River during the 40-year analysis period. These activities include effects of the OCS Program (a proposed action, and prior and future OCS lease sales), State oil and gas activity, coastal development, man-induced modifications to water quantity and air quality, crude oil imports by tanker, commercial and recreational fishing, and natural phenomena. Specific types of impact-producing factors considered in this cumulative analysis include coastal and marine environmental degradation by nonpoint runoff from estuarine OCS-related facilities, produced-water discharges, pipeline emplacements, oil spills, dredge-and-fill operations and natural catastrophes that alter or destroy habitat, commercial fishing techniques that result in sturgeon bycatch, and man-induced salinity modifications.

Vessel traffic will generally only pose a risk to Gulf sturgeon when leaving and returning to port. Major navigation channels are excluded from critical habitat. The Gulf sturgeon's characteristics of bottom-feeding and general avoidance of disturbance make the probability of vessel strike extremely remote. The explosive removal of structures as a result of a CPA proposed action will occur well offshore of Gulf sturgeon critical habitat and the riverine, estuarine, and shallow Gulf habitats where sturgeon are generally located. Environmental permit requirements and recent techniques for locating pipelines will result in very minimal impact to Gulf sturgeon critical habitat if any pipeline is installed nearshore as a result of a CPA proposed action.

Hurricanes and Other Natural Catastrophes

Natural catastrophes and non-OCS activities such as dredge-and-fill may destroy or temporarily impair Gulf sturgeon habitat. Natural catastrophes including storms, floods, droughts, and hurricanes can result in substantial habitat damage. Loss of habitat is expected to have a substantial effect on the reestablishment and growth of Gulf sturgeon populations. Natural phenomenon such as tropical storms and hurricanes will continue to occur along the Gulf Coast with varying frequency and intensity between years. Although these are usually localized and sporadic, the 2004 and 2005 hurricane seasons brought major and repeated damage to the Gulf Coast area. The effects from Hurricane Katrina (2005) are still being assessed. The impacted area included a large portion of the designated critical habitat and known locations of Gulf sturgeon. The sturgeon is located upstream in freshwater riverine habitats during hurricane season. This may give the estuarine and marine areas time to recover from hurricane impacts before the sturgeon move downstream. For instance, massive runoff due to flooding rains and swollen tributaries could cause a sharp increase in toxic contaminants in estuarine habitats. However, spreading and dilution should mitigate any threat to sturgeon very quickly. By the time the downstream migration occurs, conditions should have returned to near normal. Paruka (personal communication, 2007a) noted that his sturgeon monitoring program located fish that were displaced from the Panama City, Florida, area in Mobile Bay in Alabama. He noted this movement may have been as a result of damaged habitat in Florida; however, the return of the fish this year is indicative of habitat recovery. Similar absences were noted by Kirk and Rogillio (2007) in the Pearl River system but again current monitoring indicates that the population of Gulf sturgeon is returning. The flooding and subsequent "unwatering" of New Orleans in the fall of 2005 created concern for any sturgeon that might have been in the areas of Lake Pontchartrain, which is where those contaminated floodwaters were pumped. The COE noted in their environmental assessment that temporary impacts to Gulf sturgeon may have resulted as a part of the unwatering activities related to the pumping of floodwaters into Lake Pontchartrain. Impacts due to the quantity and quality of the floodwaters may have caused some sturgeon to seek forage and resting areas in other more undisturbed locations of Lake Pontchartrain. It was expected that any sturgeon displaced returned to the area once the unwatering activities ceased (USACE, 2005a). The COE also noted that the emergency procedures permitted in the Panama City, Florida, aftermath of Hurricane Ivan may have created temporary impacts to species including the Gulf sturgeon, but that the emergency procedures did not adversely impact the species (USACE, 2005b). After Hurricane Katrina, there were reports of fish kills and at least one confirmed report of a dead Gulf sturgeon due to low oxygen in the water from organic input from leaf litter and other sources such as raw sewage and untreated effluent (Cummins, 2005). Many municipalities or sources of discharges lost power or were flooded and were likely a source of contaminant discharge. The hurricane impacts have not yet been fully assessed for Gulf sturgeon but are generally believed to be temporary (Baker, personal communication, 2006).

Unpredicted drought events in the upper river basins are currently impacting some of the Gulf sturgeon's riverine spawning habitat along the Apalachicola River in Florida. Recently, potential threats to the Gulf sturgeon habitat in the Apalachicola River system and the receiving bays have been raised as a consequence of reducing river flow to meet upstream water needs during drought conditions in Georgia (Picard, 2007). It is expected with the current predictions of climate change that there will continue to be cyclic drought conditions that will persist in various regions of the sturgeon's range. This, combined with the increasing need for water from reservoirs in the urban areas north of the coast, will continue to be problematic for the conflicting needs for water. The OCS activities are primarily in deepwater marine locations outside of the inland spawning areas and migratory routes.

Commercial Fishing

Commercial fishing techniques such as trawling, gill netting, or purse seining, when practiced nonselectively, may impact species other than the target species. For example, Gulf sturgeons are a small part of the shrimp bycatch. It is estimated that for every 1.1 lb (0.5 kg) of shrimp harvested, 8.8 lb (4 kg) of bycatch is discarded (Sports Fishing Institute, 1989). The death of several Gulf sturgeons is expected from commercial fishing. Commercial fishing is expected to continue; however, the magnitude of the trawl fleet has been at least temporarily diminished by Hurricane Katrina. In addition, increases in trawl density and successive trawling in one area may cause long-term impacts to the critical habitat.

Dredging, Channelization, and Dredged Material Disposal

Dredge-and-fill activities occur throughout the nearshore areas of the United States. These activities range in scope from propeller dredging (scarring) by recreational boats to large-scale navigation dredging and fill for land reclamation. Non-OCS operations, such as dredge-and-fill activities, indirectly impact Gulf sturgeon through the loss or disturbance of inland spawning and nearshore nursery habitat.

Navigation channels are not included in the critical habitat. Dredged material disposal is to be used beneficially for wetland restoration or creation, therefore eliminating the covering of important benthic feeding areas or fringe wetlands. Depending on the time of year, dredging can potentially entrain eggs, larvae, or postlarval sturgeon within the coastal rivers or near the river mouths. A 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 dredging activity. The construction and maintenance of navigation channels is regulated by COE, and dredging permits are "conditioned" to avoid and minimize impacts to Gulf sturgeon and their critical habitat. The permitted activity is "conditioned" with specific time windows to exclude dredging during times of sturgeon migration, spawning, or active use of critical nursery areas. These conditioned permits are coordinated with either FWS or NMFS or both depending on the origin of the dredging operation. At present, the MMS's coordination with NMFS indicates no changes in critical habitat have occurred and they are working to develop an estimate of sturgeon habitat loss and an HSI for the species (Bolden, personal communication, 2007). They also have 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.

Oil Spills

The Gulf sturgeon could be impacted by oil spills resulting from a CPA proposed action. The highest probability for cumulative impacts to the Gulf sturgeon or its habitat would be from coastal spills or vessel collisions in close proximity to its nearshore feeding and nursery areas. Due to the distance (nearly 130 mi or 209 km offshore) of the 181 South Area to Gulf sturgeon critical habitat, migratory routes, or nursery and feeding areas, there is a very low probability of impact from spills from this area.

Direct contact with spilled oil could have detrimental physiological effects. 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. However, several factors influence the probability of spilled oil contact with Gulf sturgeon or their critical habitat. The likelihood of spill occurrence and subsequent contact with, or impact to, Gulf sturgeon and/or designated critical habitat is extremely low. Based on current OSRA modeling, there is <0.5 percent probability of oil spills (≥1,000 bbl) occurring and contacting Gulf sturgeon critical habitat as a result of an accidental spill occurring from within the 181 South Area.

The numbers and sizes of coastal spills are presented in Table 4-13 of the Multisale EIS. About 95 percent of these spills are projected to be from non-OCS-related activity. Of coastal spills <1,000 bbl, the assumed size is 5 bbl; therefore, the great majority of coastal spills would affect a very small area and dissipate rapidly. The small coastal spills that do occur from OCS-related activity would originate near terminal locations in the coastal zones of Texas, Louisiana, Mississippi, and Alabama but primarily within the Houston/Galveston area of Texas and the deltaic area of Louisiana. A total of 4-5 large (≥1,000 bbl) offshore spills are projected to occur annually from all sources Gulfwide. Of these offshore spills, one is estimated to occur every 1 to 2 years from the Gulfwide OCS Program (Table 4-15 of the Multisale EIS). A total of 1,550-2,150 smaller offshore spills (<1,000 bbl) are projected annually Gulfwide. The majority of these spills (1,350-1,900) would originate from OCS Program sources. Chapter 4.3.1.2 of the Multisale EIS describes the projections of future spill events in more detail.

For spills ≥1,000 bbl, concentrations of oil below the slick are within the ranges that cause sublethal effects on marine organisms. However, when exposure time beneath accidental spills, hydrocarbon composition, and the change in this composition during weathering are considered, exposure doses are assumed to be far less than doses reported to cause even sublethal effects (McAuliffe, 1987). Given the low probability that the low-population Gulf sturgeon would be present in the specific area where and when a spill occurs, small likelihood of contact of a surface oil slick with a demersal fish and its benthic habitat, and minimal concentrations of toxic oil relative to levels that would be toxic to adult or sub adult Gulf sturgeon, the impacts of spilled oil on this endangered subspecies are expected to be very low.

However, regardless of spill size, the effects of direct contact from spilled oil on Gulf sturgeon occur through the ingestion of oil or oiled prey and the uptake of dissolved petroleum through the gills by adults and juveniles. Contact with or ingestion/absorption of spilled oil by adult Gulf sturgeon can result in mortality or sublethal physiological impact, especially irritation of gill epithelium and disturbance of liver function. It is expected that the extent and severity of effects from oil spills will be lessened by active avoidance of oil spills by adult sturgeon. Sturgeons are demersal and would forage for benthic prey well below an oil slick on the surface. Adult sturgeon only venture out of the rivers into the marine waters of the Gulf for roughly 3 months during the coolest weather. This reduces the likelihood of sturgeon coming into contact with oil. It is expected that contact would cause sublethal irritation of gill epithelium and an increase in liver function for less than a month.

Other Impact-Producing Factors

The cumulative and possibly repetitive affects of altering water flow in coastal rivers used by sturgeon for spawning may have long-term cumulative effects on the success of future spawning populations (Picard, 2007). Changes in climate may continue to alter weather patterns such that persistent drought conditions may naturally or artificially (alter flow for reservoir maintenance) reduce river flow over critical riverine spawning habitat and, in turn, may displace spawning activities closer to the coastal waters, increasing the vulnerability of sturgeon larvae to coastal and inland spills.

In addition, the currently proposed enlargement of coastal salt domes for use as oil reserve storage will compromise flows in natal spawning rivers as well as potentially greatly modify nearshore salinity in the nearshore estuaries and bays (*Mississippi Press*, 2007). As proposed, large amounts of freshwater will be removed from coastal rivers currently used by Gulf sturgeon and will be used to hydraulically mine the salt domes, producing a hypersaline effluent that will be piped to the coastal waters.

Summary and Conclusion

The Gulf sturgeon and its critical habitat can be cumulatively impacted by activities such as oil spills, dredging, alteration and destruction of habitat, natural catastrophes, commercial fishing, and onshore alterations resulting in change in river flow and salinity modifications. The effects from contact with spilled oil will be sublethal and last for less than 1 month. Contact with spilled oil could have detrimental physiological effects. 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. However, several factors influence the probability of spilled oil contact with Gulf sturgeon or their critical habitat. The likelihood of spill occurrence and subsequent contact with, or impact to, Gulf sturgeon and/or designated critical habitat is extremely low.

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 will experience a decline in population sizes and a displacement from their current distribution that will last more than one generation. Deaths of adult sturgeon are expected to occur from commercial fishing. The incremental contribution of a CPA proposed action to the cumulative impact is negligible because the effect of contact between sale-specific oil spills and Gulf sturgeon is expected to be sublethal and last less than 1 month.

Additional research was conducted to investigate recently available information since completion of the Multisale EIS. A search of Internet information sources, as well as personnel interviews with personnel from State and Federal resource agencies, was conducted to determine the availability of recent information. No significant new information was found that would alter the conclusion as described in the Multisale EIS that the incremental contribution of a CPA proposed action's impacts on fish resources to the cumulative impact is minimal. Furthermore, activity projected to result from the addition of the

181 South Area is negligible compared with total OCS activity, and it is not likely to result in a significant contribution to cumulative impacts.

The NMFS and MMS completed consultation, as specified under Section 7 of the ESA, on the effects of the 5-Year OCS Program (2007-2012) in the CPA and WPA, inclusive of the 181 South Area. A Biological Opinion was received by MMS on July 3, 2007, agreeing with MMS that the CPA and WPA proposed actions would not adversely impact the endangered Gulf sturgeon or its critical habitat and that additional mitigative action other than those already identified and in place would not be necessary

4.1.11. Fisheries and Essential Fish Habitat

The MMS has reexamined the analysis for fisheries and essential fish habitat (EFH) presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for fisheries and EFH presented in the Multisale EIS. Due to the extreme depths in this area, the only managed fish species (and their pelagic EFH) are some of the highly migratory species including sharks, billfish, and tuna. The 181 South Area is located in very deep water, and limited activities in that area would not have any measurable additional impacts to fish resources or EFH for highly migratory species (the only managed species group that far offshore).

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Fish resources and EFH could be impacted by coastal environmental degradation, marine environmental degradation, pipeline trenching, and offshore discharges of drilling discharges and produced waters associated with routine activities. The impact of coastal and marine environmental degradation is expected to cause an undetectable decrease in fish resources or in EFH. Impacts of routine discharges are localized in time and space, are regulated by USEPA permits, and will have minimal impact. Accidental events that could impact fish resources and EFH include blowouts and oil or chemical spills. A subsurface blowout would have a negligible effect on Gulf of Mexico fish resources. If spills due to a CPA or WPA proposed action were to occur in open waters of the OCS proximate to mobile adult finfish or shellfish, the effects would likely be nonfatal and the extent of damage would be reduced due to the capability of adult fish and shellfish to avoid a spill.

Impact-producing factors of the cumulative scenario that are expected to substantially affect fish resources and EFH include coastal and marine environmental degradation, overfishing, and to a lesser degree, coastal petroleum spills and coastal pipeline trenching. At the estimated level of cumulative impact, the resultant influence on fish resources and EFH is expected to be substantial, but not easily distinguished from effects due to natural population variations. The incremental contribution of a CPA or WPA proposed action to the cumulative impacts on fisheries and EFH would be small.

4.1.11.1. Description of the Affected Environment

The description of the biology, life history, and distribution of fish resources and the description of EFH can be found in Chapters 3.2.8.1 and 3.2.8.2 of the Multisale EIS, respectively. The following information is a summary of the information presented in the Multisale EIS, which incorporates new information discussed since the publication of the Multisale EIS.

The Gulf of Mexico supports a great diversity of fish resources that are related to variable ecological factors, including salinity, primary productivity, and bottom type. These factors differ widely across the Gulf of Mexico and between the inshore and offshore waters. Characteristic fish resources are associated with the various environments and are not randomly distributed. Major gradients include rainfall and river output, bottom composition, and depth. High densities of fish resources are associated with particular habitat types. Most finfish resources are linked both directly and indirectly to the vast estuaries that ring the Gulf of Mexico. Estuaries serve as nursery grounds for a large number of marine fishes that live on the inner continental shelves, such as the anchovies, herrings, mojarras, and drums.

The Gulf also has some limited areas of hard substrate on the continental shelf, including topographic features or banks offshore Texas and Louisiana and smaller carbonate features often referred to as pinnacles offshore Mississippi and Alabama. There are thousands of these carbonate mounds or pinnacles dotting the OCS of Mississippi-Alabama that share many characteristics of patch reefs found in shallow tropical areas. The mounds are discrete, vary in size and structural complexity, and are surrounded by level sediment bottoms. The remaining OCS, ranging to a depth of approximately 200 m (656 ft), generally has a muddy or silty soft bottom. Fish communities that occur on topographic features and pinnacles are described in Chapter 3.2.8.1 of the Multisale EIS.

Deepwater demersal fishes below several hundred meters or feet of depth are better known than the deep pelagic species. Extensive trawl sampling of Gulf of Mexico continental slope demersal fish are also reported in a major MMS-funded, deep Gulf study (Gallaway et al., 1988).

Recently, hurricanes have been a prominent impacting factor to Gulf resources and have affected fish resources by destroying oyster reefs and by changing physical characteristics of inshore and offshore ecosystems. The intense hurricane season of 200,5 including Hurricanes Katrina and Rita, did not affect the offshore fisheries as much as initially expected. By far, the worst resource devastation that occurred was for oyster populations, but even this fishery has recovered significantly, as noted with a recent media statement saying, "The Louisiana Oyster Task Force said beds are being restored, and this year's haul is expected to be equal to or better than the harvests before Hurricane Katrina" (New Orleans Hospitality Briefs, 2007; WDSU.com, 2007). Some recent reports from NOAA have further documented impacts from the 2005 hurricanes on fish and fishery habitat. One recent example is NMFS's *Report to Congress on the Impact of Hurricanes Katrina, Rita, and Wilma on Commercial and Recreational Fishery Habitat of Alabama, Florida, Louisiana, Mississippi, and Texas* that was published in July 2007 (USDOC, NMFS, 2007a). This report confirms the substantial impacts of the 2005 hurricanes to nearshore habitats, especially oyster reefs. Offshore fisheries habitat sustained some impact, but not substantial. Similar information was also presented in Chapter 3.2.8.1 of the Multisale EIS. A recent report to Congress concluded "With the exception of oysters, available information indicates Gulf Coast marine resources were not significantly impacted by the 2005 hurricanes" (USDOC, NMFS, 2007b).

Additional research was conducted to investigate recently available information since completion of the Multisale EIS. A search of Internet information sources (including scientific journals), as well as interviews with personnel from academic institutions and governmental resource agencies, was conducted to determine the availability of new information. Significant informational Internet websites include the Gulf of Mexico Fisheries Management Council (http://www.gulfcouncil.org/) and NMFS's Southeast Region (http://sero.nmfs.noaa.gov/).

From April 1, 2007, through June 30, 2007, there were no major changes in the fish stock sustainability index (FSSI) reported by NMFS (USDOC, NMFS, 2007c). The following are the only changes in overfished status of FSSI stocks in the Southeast Region (April 1-June 30, 2007):

- South Atlantic gag is now approaching an overfished condition.
- Dolphin is now above 80 percent of maximum sustainable yield.
- Gulf of Mexico red grouper is now rebuilt.

181 South Area

The 181 South Area is a minimum of 177 mi (285 km) south of the panhandle of Florida. The nearest land is Louisiana over 130 mi (209 m) away. Water depths in the area range from 2,700 to 3,200 m (8,900 to 10,500 ft).

The benthic fish populations of the 181 South Area are expected to be very low in density and restricted to the few species that live at water depths below 2,700 m (8,900 ft). Pelagic, highly migratory species including billfish and tuna are expected in the area as there has been some longline fishing in this area in the past. Longlining fishing in the area will also continue in the future because the 181 South Area lies outside the large longline closure areas in the Eastern Gulf of Mexico (CSA, 2002).

Essential Fish Habitat

In consideration of existing mitigation measures, lease stipulations, and a submitted EFH Assessment document, MMS entered into a Programmatic Consultation agreement with NMFS on July 1, 1999, for petroleum development activities in the CPA and WPA. This agreement was extended into that portion of the Eastern Planning Area known as Lease Sale 181. Most of this area is now designated part of the CPA. The NMFS considered an EFH Assessment describing OCS development activities, an analysis of the potential effects, MMS's views on those effects, and proposed mitigation measures as acceptable and meeting with the requirements of EFH regulations at 50 CFR Subpart K, 600.920(g).

Further programmatic consultation was initiated and completed for the 2007-2012 lease sales addressed in the Multisale EIS, which did not include the 181 South Area. The NMFS concurred by a letter dated December 12, 2006, that the information presented in the Draft Multisale EIS satisfied the EFH consultation procedures outlined in 50 CFR 600.920, and as specified in NMFS's March 17, 2000, findings. Provided MMS proposed mitigations, NMFS's previous EFH conservation recommendations, and the standard lease stipulations and regulations are followed as proposed, NMFS agrees that impacts to EFH and associated fishery resources resulting from activities conducted under the 2007-2012 lease sales would be minimal.

To address the addition of the 181 South Area, this SEIS was submitted to NMFS for general EFH consultation agreement information. This SEIS includes all required components for a new EFH Assessment: (1) description of the proposed action; (2) description of the action agency's approach to protection of EFH and proposed mitigation, if applicable; (3) description of EFH and managed and associated species in the vicinity of the proposed action; and (4) analysis of the effects of the proposed and cumulative actions on EFH, the managed species, and associated species.

Chapters 1.5 and 2.2.2 of the Multisale EIS discuss MMS's approach to the preservation of EFH with specific mitigations. Chapter 3.2.1 of the Multisale EIS details coastal areas that are considered EFH including wetlands and areas of submerged vegetation. Chapter 3.2.2 of the Multisale EIS describes live-bottom formations and their biotic assemblages, which are considered EFH. Chapters 4.2.1.1.8 and 4.2.2.10 of the Multisale EIS contain the impact analysis of the proposed actions on EFH. Chapter 4.4.3.10 of the Multisale EIS contains the impact analysis for accidental spills on EFH. Chapter 4.5.10 of the Multisale EIS contains the impact analysis of cumulative actions.

In 2005, a new amendment to the original EFH Generic Amendment was finalized (GMFMC, 2005). One of the most significant proposed changes in this amendment reduced the extent of EFH relative to the 1998 Generic Amendment by removing EFH description and identification from waters between 100 fathoms and the seaward limit of the EEZ. There are Fishery Management Plans (FMP's) in the Gulf of Mexico OCS region for shrimp, red drum, reef fishes, coastal migratory pelagics, stone crabs, spiny lobsters, coral and coral reefs, billfish, and highly migratory species (HMS); however, due to water depth, the 181 South Area is only affected by FMP's and EFH designation for highly migratory species including sharks, billfish, and tuna.

The managed species with EFH in the 181 South Area can be easily determined by using EFH designation maps produced by NMFS (USDOC, NMFS, 1999a and b). Of all the 32 species of shark described by NMFS in the final FMP for Atlantic tunas, swordfish, and sharks (USDOC, NMFS,1999b), only the longfin mako shark has designated EFH in the 181 South Area for neonate and early juveniles, juvenile subadult, and adults. Also presented in same FMP are the EFH maps for tunas and swordfish.

Bigeye and Atlantic albacore tuna do not have EFH for any life history stage in the 181 South Area. The bluefin tuna and skipjack tuna are depicted as having EFH in the 181 South Area for spawning, eggs, and larva but not for adults or juvenile/subadults. Yellowfin tuna are shown as having EFH in the area for spawning, eggs, larvae, and juvenile/subadults, but not for adults. Swordfish have EFH in the 181 South Area for all life stages except adults where the map depicts EFH just outside the 181 South Area.

Billfish EFH maps are presented in Amendment 1 to the Atlantic billfish FMP (USDOC, NMFS, 1999a). Sailfish and the longbill spearfish do not have EFH in the 181 South Area, but two marlin species do. The white marlin has only adult EFH in the area, and the blue marlin has only juvenile/subadult EFH in the 181 South Area.

The abundance of the above-listed highly migratory species in the 181 South Area is not well known. The CSA (2002) presents data on longline sets in the area between 1994 and 1998. This region is not heavily fished, but there is some longline activity, primarily directed at yellowfin tuna. The designated habitat of concern would not be bottom related, but it would be the pelagic water column to a depth of up to 800 m (2,625 ft) for swordfish and perhaps as deep as 1,000 m (3,280 ft) if adult bluefin tuna were to occur in the area (Block et al., 2001).

4.1.11.2. Impacts of Routine Events

Background/Introduction

A detailed description of the possible impacts from routine activities associated with a CPA or WPA proposed action on fish resources and EFH is presented in Chapters 4.2.2.1.10 and 4.2.1.1.8 of the Multisale EIS, respectively. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

Effects on fish resources and EFH from routine activities associated with a proposed action could result from coastal environmental degradation, marine environmental degradation, pipeline trenching, and offshore discharges of drilling discharges and produced waters.

Since the majority of fish species within the CPA and WPA are estuary dependent, coastal environmental degradation resulting from a proposed action, although indirect, 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 Gulf wetlands and coastal estuaries as nursery habitat and from the functional impairment of existing habitat through decreased water quality.

Since many of the fish species within the CPA and WPA are dependent on offshore water and a variety of specific bottom types including hard substrate, marine environmental degradation resulting from a proposed action, although indirect, has the potential to adversely affect EFH and fish resources. Offshore EFH includes both high- and low-relief live bottoms (pinnacles) and natural reefs (topographic features).

CPA Proposed Action Analysis

The routine impact effects of a CPA proposed action on coastal wetlands and coastal water quality, with the exception of accidental events, are analyzed in detail in the Multisale EIS in Chapters 4.2.2.1.3.2 and 4.2.2.1.2.1, respectively. Collectively, the adverse impacts from these effects are called coastal environmental degradation. The effects of a proposed action on offshore live bottoms and marine water quality are analyzed in detail in Chapters 4.2.2.1.4.1.1 and 4.2.2.1.2.2 of the Multisale EIS, respectively. Collectively, the adverse impacts from these effects are called marine environmental degradation in this SEIS. The direct and/or indirect effects from coastal and marine environmental degradation on fish resources and EFH are summarized and considered below.

Coastal Environmental Degradation

A range of 0-1 new pipeline landfalls are projected in support of each proposed action. Localized, minor degradation of coastal water quality is expected in waterbodies in the immediate vicinity of coastal shore bases, commercial waste-disposal facilities, and oil refineries or gas processing plants as a result of routine effluent discharges and runoff. There are 0-1 new gas processing plants projected in support of a CPA proposed action.

Wetlands that could be impacted for some period of time or converted to open water are discussed in Chapter 4.2.2.1.3.2 of the Multisale EIS. A small amount of the routine dredging done in coastal areas will be directly or indirectly due to a proposed action. It is expected that coastal environmental degradation from a proposed action would have little effect on fish resources or EFH. Recovery of fish resources or EFH can occur from more than 99 percent, but not all, of the potential coastal environmental degradation. Fish populations, if left undisturbed, will regenerate in one generation and most EFH can recuperate quickly, but the loss of wetlands as EFH could be permanent. At the expected level of effect, the resultant influence on fish resources or EFH from a CPA proposed action would be negligible and indistinguishable from natural population variations.

Marine Environmental Degradation

The Live Bottom (Pinnacle Trend) and Topographic Features Stipulations are discussed in Chapters 2.3.1.3 and 2.4.1.3 the Multisale EIS. The application of the new category of *Potentially Sensitive Biological Features* in NTL 2004-G05 will also serve to prevent impacts to hard-bottom EFH habitat associated with topographic features that may lie outside previously defined No Activity Zones. For any activities associated with a proposed action, USEPA's Region 6 (and Region 4 for some areas) will regulate discharge requirements for the CPA through their NPDES permits.

The projected total number of platform installations resulting from a CPA proposed action is 28-41 for all water depths (**Table 3-2**). Bottom disturbance from structure emplacement operations associated with a proposed action would produce localized, temporary increases in suspended sediment loading, resulting in decreased water clarity and little reintroduction of pollutants.

Structure removal results in artificial habitat loss and causes fish kills when explosives are used. Most multi-leg platforms in water depths <156 m (<512 ft) are removed by severing their pilings with explosives placed 5 m (16 m) below the seafloor. It is projected that approximately 14 structures in water depths <200 m (<656 ft) in the CPA will be removed using explosives as a result of a proposed action. It is expected that structure removals would have a negligible effect on fish resources because these activities kill only those fish proximate to the removal site.

The projected length of pipeline installations for a CPA proposed action is 130-2,075 km (81-1,289 mi) for all water depths. Trenching for pipeline burial has the potential to adversely affect fish resources. Any affected population is expected to recover to predisturbance condition in one generation. At the expected level of impact, the resultant influence on fish resources would be negligible and indistinguishable from other natural population variations.

The major sources of routine discharges to marine waters associated with a CPA proposed action are the temporary discharge of drilling muds and cuttings and the long-term discharge of produced-water effluent. Offshore discharges of drilling muds are expected to dilute to background levels within 1,000 m (3,280 ft) of the discharge point. Produced-water discharges contain components and properties potentially detrimental to fish resources. Offshore discharges of produced water are expected to disperse and dilute to background levels within 1,000 m (3,280 ft) of the discharge point (CSA, 1997).

Because of the extreme depths of the 181 South Area, the only managed fish species (and their pelagic EFH) are some of the highly migratory species including sharks, billfish, and tuna. One additional structure is projected to be installed as a result of the addition of the 181 South Area. Routine activities in the 181 South Area would cause negligible impacts and would not deleteriously affect fish resources or EFH.

It is expected that marine environmental degradation from a CPA proposed action would have little effect on fish resources or EFH. The impact of marine environmental degradation is expected to cause an undetectable decrease in fish populations. Recovery of fish resources or EFH can occur from 100 percent of the potential marine environmental degradation. Fish populations, if left undisturbed, will regenerate in one generation. Offshore live bottoms including pinnacles and topographic features are not expected to be impacted. Offshore discharges and subsequent changes to marine water quality will be regulated by USEPA NPDES permits. At the expected level of effect, the resultant influence on fish resources or EFH would be negligible and indistinguishable from natural population variations.

Other Factors

Structure emplacements can act as fish attracting devices (FAD's) and can result in aggregation of highly migratory fish species. A number of commercially important highly migratory species, such as tunas and marlins, are known to congregate and to be caught around FAD's. The attraction of pelagic highly migratory species to offshore structures will likely occur to some degree.

Almost immediately after a platform is installed, the structure would be acting as an artificial reef. After just a few years, many of the fish species present would be residents and not new transients from nearby areas. Reef-building corals and other species such as black corals have also been documented colonizing numerous platforms (Sammarco et al., 2004; Boland and Sammarco, 2005).

WPA Proposed Action Analysis

The routine impact effects of a WPA proposed action on coastal wetlands and coastal water quality, with the exception of accidental events, are analyzed in detail in Chapters 4.2.1.1.3.2 and 4.2.1.1.2.1 of the Multisale EIS, respectively. Collectively, the adverse impacts from these effects are called coastal environmental degradation. The effects of a WPA proposed action on offshore live bottoms and marine water quality are analyzed in detail in Chapters 4.2.1.1.4.1.1 and 4.2.1.1.2.2 of the Multisale EIS, respectively. Collectively, the adverse impacts from these effects are called marine environmental degradation in this SEIS. The direct and/or indirect effects from coastal and marine environmental degradation on fish resources and EFH are summarized and considered below.

Coastal Environmental Degradation

A range of 0-1 new pipeline landfalls are projected in support of each proposed action. Localized, minor degradation of coastal water quality is expected in waterbodies in the immediate vicinity of coastal shore bases, commercial waste-disposal facilities, and oil refineries or gas processing plants as a result of routine effluent discharges and runoff. There are 0-1 new gas processing plants projected in support of a WPA proposed action.

Wetlands that could be impacted for some period of time or converted to open water are discussed in Chapter 4.2.1.1.3.2 of the Multisale EIS. A small amount of the routine dredging done in coastal areas will be directly or indirectly due to a proposed action. It is expected that coastal environmental degradation from a proposed action would have little effect on fish resources or EFH. Recovery of fish resources or EFH can occur from more than 99 percent, but not all, of the potential coastal environmental degradation. Fish populations, if left undisturbed, will regenerate in one generation and most EFH can recuperate quickly, but the loss of wetlands as EFH could be permanent. At the expected level of effect, the resultant influence on fish resources or EFH from a WPA proposed action would be negligible and indistinguishable from natural population variations.

Marine Environmental Degradation

The Topographic Features Stipulation is discussed in Chapters 2.2.1.3.1 and 2.3.1.3.1 of the Multisale EIS. (The live bottom (Pinnacle Trend) features do not occur in the WPA). The application of the new category of *Potentially Sensitive Biological Features* in NTL 2004-G05 will also serve to prevent impacts to hard-bottom EFH habitat associated with topographic features that may lie outside previously defined No Activity Zones. For any activities associated with a proposed action, USEPA's Region 6 will regulate discharge requirements for the WPA through their NPDES permits.

The projected total number of platform installations resulting from a WPA proposed action is 28-41 for all water depths (**Table 3-3**). Bottom disturbance from structure emplacement operations associated with a proposed action would produce localized, temporary increases in suspended sediment loading, resulting in decreased water clarity and little reintroduction of pollutants.

Structure removal results in artificial habitat loss and causes fish kills when explosives are used. Most multi-leg platforms in water depths <156 m (<512 ft) are removed by severing their pilings with explosives placed 5 m (16 ft) below the seafloor. It is projected that 10-16 structures in water depths <200 m (<656 ft) in the WPA will be removed using explosives as a result of a proposed action. It is expected that structure removals would have a negligible effect on fish resources because these activities kill only those fish proximate to the removal site.

The projected length of pipeline installations for a WPA proposed action is 130-760 km (81-472 mi) for all water depths. Trenching for pipeline burial has the potential to adversely affect fish resources. Any affected population is expected to recover to predisturbance condition in one generation. At the expected level of impact, the resultant influence on fish resources would be negligible and indistinguishable from other natural population variations.

The major sources of routine discharges to marine waters associated with a WPA proposed action are the temporary discharge of drilling muds and cuttings and the long-term discharge of produced-water effluent. Offshore discharges of drilling muds are expected to dilute to background levels within 1,000 m (3,280 ft) of the discharge point. Produced-water discharges contain components and properties potentially detrimental to fish resources. Offshore discharges of produced water are expected to disperse and dilute to background levels within 1,000 m (3,280 ft) of the discharge point (CSA, 1997).

It is expected that marine environmental degradation from a WPA proposed action would have little effect on fish resources or EFH. The impact of marine environmental degradation is expected to cause an undetectable decrease in fish populations. Recovery of fish resources or EFH can occur from 100 percent of the potential marine environmental degradation. Fish populations, if left undisturbed, will regenerate in one generation. Offshore live bottoms and topographic features are not expected to be impacted. Offshore discharges and subsequent changes to marine water quality will be regulated by USEPA NPDES permits. At the expected level of effect, the resultant influence on fish resources or EFH would be negligible and indistinguishable from natural population variations.

Other Factors

Structure emplacements can act as FAD's and can result in aggregation of highly migratory fish species. A number of commercially important highly migratory species, such as tunas and marlins, are known to congregate and to be caught around FAD's. The attraction of pelagic highly migratory species to offshore structures will likely occur to some degree.

Almost immediately after a platform is installed, the structure would be acting as an artificial reef. After just a few years, many of the fish species present would be residents and not new transients from nearby areas. Reef-building corals and other species such as black corals have also been documented colonizing numerous platforms (Sammarco et al., 2004; Boland and Sammarco, 2005).

Summary and Conclusion

It is expected that coastal and marine environmental degradation from a CPA or WPA proposed action would have little effect on fish resources or EFH. The impact of coastal and marine environmental degradation is expected to cause an undetectable 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 and would not deleteriously affect fish resources or EFH. At the expected level of impact, the resultant influence on fish resources would cause less than a 1 percent change in fish populations or EFH. As a result, there would be little disturbance to fish resources or EFH.

The MMS has reexamined the analysis for impacts to fish resources and EFH presented in the Multisale EIS, based on the additional information presented above. No significant new information was found that would alter the overall conclusion that impacts to fish resources and EFH from routine activities associated with a CPA or WPA proposed action would be minimal to none. A proposed action is expected to result in less than a 1 percent decrease in fish resources and/or standing stocks or in EFH. It would require one generation for fish resources to recover from 99 percent of the impacts. Recovery from the loss of wetlands habitat would probably not occur. The 181 South Area is located in very deep water and limited activities in that area would not have any measurable additional impacts to fish resources or EFH for highly migratory species (the only managed species group that far offshore).

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

4.1.11.3. Impacts of Accidental Events

A detailed description of accidental impacts upon fish resources, EFH, and commercial fishing can be found in Chapter 4.4.10 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Accidental events that could impact fish resources and EFH include blowouts and oil or chemical spills. Subsurface blowouts, though highly unlikely, have the potential to adversely affect fish resources. A blowout at the seafloor could create a crater, and resuspend and disperse large quantities of bottom sediments within a 300-m (984-ft) radius from the blowout site, potentially affecting a limited number of fish in the immediate area. The majority of mobile deep-sea benthic or near-bottom fish taxa would be expected to leave (and not reenter) the area of a blowout before being impacted by the localized area of resuspended sediments.

Resuspended sediments may clog fish gills and interfere with respiration. Settlement of resuspended sediments may directly smother deep-water invertebrates that serve as food resources. However, coarse sediment should be redeposited quickly within several hundred meters or feet of a blowout site. Finer sediments can be more widely dispersed and redeposited over a period of hours to days within a few thousand meters or feet depending on the particle size.

Oil loss from a blowout is rare. Less than 10 percent of blowouts in recent history have resulted in spilled oil. Gas blowouts consist mainly of methane, which rapidly dissolves in the water column or disperses upward into the air, and are less of an environmental risk. Loss of gas well control does not release liquid hydrocarbons into the water.

The risk of oil spills from a proposed action has the potential to affect fish resources and EFH, and it is discussed in detail in Chapter 4.3.1 of the Multisale EIS. The toxicity of an oil spill depends on the concentration of the hydrocarbon components exposed to the organisms (in this case fish and shellfish) and the variation of the sensitivity of the species considered. The effects on and the extent of damage to fisheries resources from a petroleum spill are restricted by time and location.

Oil has the potential to affect finfish through direct ingestion of hydrocarbons or ingestion of contaminated prey, through uptake of dissolved petroleum products through the gills and epithelium of adults and juveniles, and through the death of eggs and decreased survival of larvae (NRC, 1985 and 2002). These mechanisms and historical examples of large oil spills are discussed at length in Chapter 4.4.10 in the Multisale EIS. Impacts of oil spills on adult fish have generally been thought to be minimal. The NOAA, Office of Response and Restoration's Internet site states, "Most often, fish either are unaffected by oil, or are affected only briefly" (USDOC, NOAA, 2006). Adult fish are likely to actively avoid a spill, thereby limiting the effects and lessening the extent of damage (Baker et al., 1991; Malins et al., 1982; Maki et al., 1995).

Oil produced from the 181 South Area is anticipated to be a heavier oil than is typically found in shallower areas of the Gulf and, thus, it is projected linger in the environment longer than oil containing more volatile fractions. The amount of additional production from this area, however, is not anticipated to increase the risk of an oil spill ≥500 bbl occurring. Oil spills originating in the 181 South Area will not impact inshore estuaries, because it is located about 130 mi (209 km) from the nearest shore.

One remaining type of spill could result from the accidental release of large volumes of drilling muds. This has occurred on occasion in deep water where drilling risers have failed and synthetic drilling fluids contained in the riser escaped to the seafloor (Boland et al., 2004). In recent instances, 600-800 bbl of synthetic drilling fluids were released. The fates and effects of such large point-source releases have not been studied to date, but a new project is currently funded to do just that after the next event occurs, *Synthetic-based Fluid Spill of Opportunity: Environmental Impact and Recovery* (USDOI, MMS, in preparation). Gallaway and Baubien (1997) did report an increased abundance of fish, 3-10 times that expected, around the Pompano platform at 565 m (1,854 ft). The increase is thought to be related to organic enrichment from synthetic drilling mud discharges that resulted in an increase in benthic animals the fish were likely feeding on.

CPA Proposed Action Analysis

The effect of accidental events from a CPA proposed action on coastal wetlands and coastal water quality is analyzed in Chapters 4.4.3.2 and 4.4.2.1 of the Multisale EIS, respectively, and in **Chapter 4.1.2.1.3** of this SEIS.

Loss of well control and resultant blowouts seldom occur on the Gulf OCS. The potential causes and probabilities of blowouts are discussed in Chapter 4.3.1.2 of the Multisale EIS**.** A blowout with hydrocarbon release has a low probability of occurring as a result of a proposed action. Only 2-3 blowouts are projected for the entire depth range of a CPA proposed action. A blowout with oil release is not expected to occur. The few blowouts that could occur in the CPA as part of a proposed action would cause limited impacts to localized areas. Given the exposure of the area to high levels of suspended sediments and the low probability that a large blowout would occur, blowouts are not expected to significantly affect future water quality (EFH).

The potential causes, sizes, and probabilities of petroleum spills estimated to occur during activities associated with a CPA proposed action are discussed in **Chapter 3.2.1** and are listed in **Table 3-6** for offshore spills. Information on spill response and cleanup and persistence is contained in **Chapter 3.2.1.5**.

The probabilities of various size offshore spills occurring over the life of a proposed action are listed in **Table 3-6**. For a CPA proposed action, there is a 69-86 percent chance of one or more spills ≥1,000 bbl occurring.

The most likely source or cause of an offshore spill is also discussed in Chapters 4.3.1.5.2 and 4.3.1.6.2 of the Multisale EIS**.** The most likely size of spill is the smallest size group, <1 bbl. Spills that contact coastal bays and estuaries in Texas or Louisiana would have the greatest potential to affect fish resources.

The risks of an oil spill ≥1,000 bbl occurring and contacting county and parish shorelines and specific sensitive biological features were calculated and are presented in Figures 4-14 and 4-16 of the Multisale EIS and in **Figures 3-6 through 3-11** of this SEIS. The probability of an oil spill ≥1,000 bbl occurring and passing over Sonnier Bank is 3-5 percent as the result of a CPA proposed action over its 40-year life. As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. Activity that would result from the addition of the 181 South Area would cause a negligible increase in the risk of a large spill occurring and contacting county and parish shorelines and specific sensitive biological features.

There is a small risk of spills occurring during shore-based support activities. The great majority of these will be very small. Most of these incidents would occur at or near pipeline terminals or shore bases and are expected to affect a highly localized area with low-level impacts. As a result of spill response and cleanup efforts, most of the inland spill would be recovered and what is not recovered would affect a very small area and dissipate rapidly. A total of 46-102 coastal spills of all sizes as a result of a CPA proposed action over its 40-year life is estimated to occur. It is also assumed that a petroleum spill would occasionally contact and affect nearshore and coastal areas of migratory Gulf of Mexico fisheries. These species are highly migratory and would actively avoid the spill area.

The effect of petroleum spills on fish resources as a result of a proposed action is expected to cause less than a 1 percent decrease in fish resources or standing stocks of any population. At the expected level of impact, the resultant influence on fish populations within or in the general vicinity of the proposed lease sale area would be negligible and indistinguishable from natural population variations.

Due to the extreme depth of the 181 South Area, the only managed fish species (and their pelagic EFH) are some of the highly migratory species including sharks, billfish, and tuna. Up to one additional structure is projected to be installed as a result of the addition of the 181 South Area. Any possible accidental events occurring from the very limited activity in the 181 South Area would cause negligible impacts and would not deleteriously affect fish resources or EFH.

WPA Proposed Action Analysis

The effect of accidental events from a WPA proposed action on coastal wetlands and coastal water quality is analyzed Chapters 4.4.3.2 and 4.4.2.1 of the Multisale EIS and in **Chapter 4.1.2.1.3** of this SEIS.

Loss of well control and resultant blowouts seldom occur on the Gulf OCS. The potential causes and probabilities of blowouts are discussed in Chapter 4.3.1.2 of the Multisale EIS**.** A blowout with hydrocarbon release has a low probability of occurring as a result of a proposed action. Only 1-2 blowouts are projected for the entire depth range of a WPA proposed action. A blowout with oil release is not expected to occur. The few blowouts that could occur in the WPA as part of a proposed action would cause limited impacts to localized areas. Given the exposure of the area to high levels of suspended sediments and the low probability that a large blowout would occur, blowouts are not expected to significantly affect future water quality (EFH).

The potential causes, sizes, and probabilities of petroleum spills estimated to occur during activities associated with a WPA proposed action are discussed in **Chapter 3.2.1** and are listed in **Table 3-6** for offshore spills. Information on spill response and cleanup and persistence is contained in **Chapter 3.2.1.5**.

The probabilities of various size offshore spills occurring over the life of a WPA proposed action are listed in **Table 3-6**. For a WPA proposed action, there is a 31-46 percent chance of one or more spills ≥1,000 bbl occurring.

The most likely source or cause of an offshore spill is also discussed in Chapters 4.3.1.5.2 and 4.3.1.6.2 of the Multisale EIS**.** The most likely size of spill is the smallest size group, <1 bbl. Spills that contact coastal bays and estuaries in Texas or Louisiana would have the greatest potential to affect fish resources.

The risks of an oil spill ≥1,000 bbl occurring and contacting county and parish shorelines and specific sensitive biological features were calculated and are presented in Figures 4-12, 4-13, 4-14, and 4-16 of the

Multisale EIS**.** The probability of an oil spill ≥1,000 bbl occurring and passing over Stetson Bank is 2-4 percent and the Flower Garden Banks is 4-7 percent as the result of a WPA proposed action over its 40-year life. The biological resources of other hard/live bottoms in the Gulf of Mexico (EFH) would remain unharmed as spilled substances could, at the most, reach the seafloor in minute concentrations considering the great distances and time required for transportation from the deepwater areas of a WPA proposed action.

There is a small risk of spills occurring during shore-based support activities. The great majority of these will be very small. Most of these incidents would occur at or near pipeline terminals or shore bases and are expected to affect a highly localized area with low-level impacts. As a result of spill response and cleanup efforts, most of the inland spill would be recovered and what is not recovered would affect a very small area and dissipate rapidly. A total of 15-34 coastal spills of all sizes as a result of a WPA proposed action over its 40-year life is estimated to occur. It is also assumed that a petroleum spill would occasionally contact and affect nearshore and coastal areas of migratory Gulf of Mexico fisheries. These species are highly migratory and would actively avoid the spill area.

The effect of petroleum spills on fish resources as a result of a proposed action is expected to cause less than a 1 percent decrease in fish resources or standing stocks of any population. At the expected level of impact, the resultant influence on fish populations within or in the general vicinity of the proposed lease sale area would be negligible and indistinguishable from natural population variations.

Summary and Conclusion

Accidental events resulting from oil and gas development in a CPA or WPA proposed action area have the potential to cause some detrimental effects on fisheries and EFH. A subsurface blowout would have a negligible effect on Gulf of Mexico fish resources. If spills due to a proposed action were to occur in open waters of the OCS proximate to mobile adult finfish or shellfish, the effects would likely be nonfatal and the extent of damage would be reduced due to the capability of adult fish and shellfish to avoid a spill, to metabolize hydrocarbons, and to excrete both metabolites and parent compounds. The effect of proposed-action-related oil spills on fish resources is expected to cause less than a 1 percent decrease in standing stocks of any population. Historically, there have been no oil spills of any size that have had a long-term impact on fishery populations.

The MMS has reexamined the analysis for impacts to fish resources and EFH presented in the Multisale EIS, based on the additional information presented above. No significant new information was found that would alter the overall conclusion that impacts to fish resources and EFH from routine activities associated with a CPA or WPA proposed action would be minimal to none. At the expected level of impact, the resultant influence on fish populations and EFH from a proposed action in the CPA or WPA would be negligible and indistinguishable from variations due to natural causes; however, wetland loss could occur due to a petroleum spill contacting inland areas. The proposed actions are expected to result in less than a 1 percent decrease in fish resources and/or standing stocks or in EFH. It would require one generation for fish resources to recover from 99 percent of the impacts. Recovery from the loss of wetlands habitat would probably not occur. Any possible accidental events occurring from the limited activity in the 181 South Area would not deleteriously affect fish resources or EFH.

4.1.11.4. Cumulative Impacts

Background/Introduction

A detailed description of cumulative impacts upon fish and EFH can be found in Chapter 4.5.10 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

This cumulative analysis summary considers activities that could occur and adversely affect fish resources and EFH in the northern Gulf of Mexico during the 40-year analysis period. These activities include effects of the OCS Program (a proposed action, and prior and future OCS lease sales), State oil and gas activity, coastal development, crude oil imports by tanker, commercial and recreational fishing, and natural phenomena. Specific types of impact-producing factors considered in this cumulative analysis include coastal environmental degradation; marine environmental degradation; commercial and recreational fishing techniques or practices; hypoxia; red or brown tides; hurricanes; removal of production structures; petroleum spills; subsurface blowouts; pipeline trenching; and offshore discharges of drilling muds and produced waters. All of these subjects are discussed at length in Chapter 4.5.10 of the Multisale EIS.

The most serious impact to coastal EFH is the cumulative effects on wetlands that are occurring at an ever-increasing rate as the Gulf Coast States' populations increase. The cumulative impacts of pipelines to wetlands are described in Chapter 4.5.3.2 of the Multisale EIS. Canal dredging primarily accommodates commercial, residential, and recreational development. Additional details of cumulative wetlands loss, including impacts from major storms, such as the hurricanes of 2005, are detailed in Chapter 4.5.3.2 of the Multisale EIS. The incremental contribution of a CPA or WPA proposed action would be a very small part of the cumulative impacts to wetlands.

The coastal waters of Texas, Louisiana, Mississippi, Alabama, and the Florida Panhandle are expected to continue to experience nutrient overenrichment, periods of low-dissolved oxygen, and toxin and pesticide contamination, resulting in the loss of both commercial and recreational uses of the affected waters. Fish kills, shellfish-ground closures, and restricted swimming areas would likely increase in numbers over the next 30-40 years (although some areas have seen improvements and reopened for swimming, such as Lake Pontchartrain). The incremental contribution of a proposed action would be a very small part of the cumulative impacts to coastal water quality. Localized, minor degradation of coastal water quality is expected from a proposed action within the immediate vicinity of the waterbodies proximate to the proposed service bases, commercial waste-disposal facilities, and gas processing plants as a result of routine effluent discharges and runoff. Only a very small amount of dredging would occur as a result of a CPA or WPA proposed action.

Non-OCS sources of impacts on biological resources and the structure of live bottoms include natural disturbances (e.g., turbidity, disease, and storms), anchoring by recreational and commercial vessels, and commercial and recreational fishing. These impacts may result in severe and permanent mechanical damage at various scales to live-bottom communities. The impacts of the 2005 hurricanes to the shallowest topographic features were investigated in 2006 and indicated some physical damage from wave energy to a large portion of the shallow habitat on one pinnacle at Sonnier Bank and to numerous coral heads at the Flower Garden Banks.

The OCS-related cumulative activities could impact the biological resources and the structure of live bottoms by the anchoring of vessels, emplacement of structures (drilling rigs, platforms, and pipelines), sedimentation (operational waste discharges, pipeline emplacement, explosive removal of platforms, and blowouts), and chemical contamination (produced water, operational waste discharges, and petroleum spills). The Live Bottom (Pinnacle Trend) Stipulation (in the CPA) and the Topographic Features Stipulation (in the CPA and WPA) would prevent most of the potential impacts on live-bottom communities and EFH from the OCS Program and from bottom-disturbing activities (anchoring, structure emplacement and removal, and pipeline trenching), operational offshore waste discharges (drilling muds and cuttings, and produced waters), and blowouts.

Surface oil spills from OCS Program-related activities would have the greatest chance of impacting high-relief live bottoms (includes topographic features and pinnacles) located in depths <20 m (66 ft) (mostly sublethal impacts); however, all pinnacle features are located deeper than 20 m (66 ft); the shallowest described is below 60 m (200 ft). Only four named topographic features reach depths of <20 m (66 ft): East and West Flower Garden Banks, Sonnier Bank, and Stetson Bank. Subsurface spills (pipeline spills) could cause localized, sublethal (short-term, physiological changes) impacts on the live bottoms; however, such events would be highly unlikely since the protective lease stipulations would prevent oil pipelines from being installed in the immediate vicinity of high-relief live bottoms. The impact of OCS-related activities on the live bottoms of the cumulative activity area would probably be slight because community-wide impacts should not occur.

A proposed action would add slightly to the overall offshore water quality degradation through the disposal of offshore operational wastes and sedimentation/sediment resuspension. Other activities of a proposed action potentially contributing to regional impacts would be the effects of petroleum spills and anchoring. The extent of these impacts would be limited by the implementation of the protective lease stipulations and the depths of all but three high-relief, live-bottom habitats (>20 m or 66 ft). The incremental contribution of a CPA or WPA proposed action to the cumulative impacts on fisheries and EFH would be small.

Municipal, agricultural, and industrial coastal discharges and land runoff would impact the health of marine waters. Coastal sources are assumed to exceed all other sources, with the Mississippi River continuing to be the major source of contaminants to the north-central Gulf of Mexico area. Even with the increased understanding of the agricultural sources of nutrients moving down the Mississippi River and causing the hypoxic areas off Louisiana every year, there has been little accomplished leading to reductions in those sources. In the case of mercury, the amount of mercury entering the Gulf of Mexico from all offshore oil and gas facilities contributes only 0.3 percent of the mercury coming from the air and Mississippi River (Neff, 2002).

Offshore vessel traffic and OCS operations would contribute in a small way to regional degradation of offshore waters through spills and waste discharges. All spill incidents (OCS and others) and activities increasing water-column turbidity are assumed to cause localized water quality changes for up to 3 months for each incident. The incremental contribution of a CPA or WPA proposed action to degradation of marine water quality would be small.

It is expected that coastal and marine environmental degradation from the OCS Program and non-OCS activities would affect fish populations and EFH. The impact of coastal and marine degradation from both OCS Program and non-OCS activities is expected to cause no more than a 10 percent decrease in fish populations or EFH. The incremental contribution of a CPA or WPA proposed action to these cumulative impacts would be small and likely undetectable.

Fishing

Fishing activities that could impact live bottoms would include trawl fishing and trap fishing. These techniques and their impacts are described in detail in the Chapter 4.5.10 of the Multisale EIS.

Competition between large numbers of commercial and recreational fishermen for a given fishery resource, as well as natural phenomena such as weather, hypoxia, and red or brown tides, may reduce fish resource standing populations. The impact of overfishing on fish resources can cause a measurable decrease in populations. Fishing techniques such as trawling or purse seining, when practiced nonselectively, may reduce the standing stocks of the desired target species as well as significantly impact species other than the target. Management practices for many fisheries stocks have resulted in a number of successes in recent years. It is expected that overfishing of some targeted species and trawl fishery bycatch would adversely affect fish resources; however, fishery management councils are moving toward additional new regulations and restrictions to address overfishing of most managed species. At the estimated level of effect, if overfishing were to occur, the resultant influence on fish resources would be expected to be substantial and easily distinguished from effects due to natural population variations.

Structure Removals

Structure removals would result in artificial habitat loss. It is estimated that 1,072-1,148 structures would be removed as a result of the OCS Program in the WPA and 4,925-4,949 structures would be removed in the CPA throughout all water depths during the 40-year analysis period (Tables 4-5 and 4-6 of the Multisale EIS). These numbers also represent additional installations in the same 40-year period. It is expected that structure removals would have a major effect on fish resources near the removal sites when explosives are used. However, only those fish proximate to sites removed by explosives would be killed; these expected impacts to fish resources have been shown to be small overall and would not alter determinations of status for impacted species or result in changes in management strategies (Gitschlag et al., 2000).

Spills

Spills that contact coastal bays, estuaries, and offshore waters when pelagic eggs and larvae are present have the greatest potential to affect fish resources. If spills were to occur in coastal bays, estuaries, or waters of the OCS proximate to mobile adult finfish or shellfish, the effects would likely be nonfatal and the extent of damage would be reduced due to the capability of adult fish and shellfish to avoid a spill, to metabolize hydrocarbons, and to excrete both metabolites and parent compounds. For eggs and larvae contacted by spilled diesel, the effect is expected to be lethal.

The numbers and sizes of coastal spills are presented in Table 4-13 of the Multisale EIS. About 95 percent of these spills are projected to be from non-OCS-related activity. Of coastal spills <1,000 bbl, the assumed size is 5 bbl; therefore, the great majority of coastal spills would affect a very small area and dissipate rapidly. The small coastal spills that do occur from OCS-related activity would originate near terminal locations in the coastal zones of Texas, Louisiana, Mississippi, and Alabama but primarily within the Houston/Galveston area of Texas and the deltaic area of Louisiana.

One large (≥1,000 bbl) offshore spill is projected to occur annually from the Gulfwide OCS Program (Table 4-13 of the Multisale EIS). A total of 1,500-1,800 smaller offshore spills (<1,000 bbl) are projected annually Gulfwide. Of these, 450-500 would originate from OCS Program sources. Chapter 4.3.1.2 in the Multisale EIS describes projections of future spill events in more detail. The OCS-related spills in the cumulative area are expected to cause a 1 percent or less decrease in fish resources. The impact of non-OCS-related spills in this area is expected to cause a 10 percent or less decrease in fish resources.

Sediment Resuspension, Muds, and Cuttings

Subsurface blowouts of both oil and natural gas wells have the potential to affect adversely fishery resources. Loss of well control and resultant blowouts seldom occur on the Gulf of Mexico OCS (7 blowouts per 1,000 well starts; <10% would result in some spilled oil). Considering the entire OCS Program during the 40-year analysis period, it is projected that there would be 63-75 blowouts for all water depths in the WPA and 169-197 blowouts in the CPA. Sandy sediments would be quickly redeposited within 400 m (1,312 ft) of a blowout site, and finer sediments would be widely dispersed and redeposited within a few thousand meters or feet over a period of 30 days or longer. These events are expected to have a negligible impact on fish populations. It is expected that the infrequent subsurface blowout that may occur on the Gulf of Mexico OCS would have a negligible effect on offshore fish resources

Sediment would be resuspended during the installation of pipelines. A total of 2,340-9,850 km (1,454-6,120 mi) of pipeline is projected to be installed in the WPA and 2,539-18,790 km (1,578-11,676 mi) is projected in the CPA (only in the water depth category of <60 m or 200 ft) during the 40-year analysis period. The effect on fish resources from pipeline trenching is expected to be minimal and to cause a 1 percent or less decrease in standing stocks.

Drilling-mud discharges contain chemicals toxic to marine fishes; however, this is only at concentrations four or five orders of magnitude higher than those found more than a few meters or feet from the discharge point. Offshore discharges of drilling muds would dilute to very near background levels within 1,000 m (3,280 ft) of the discharge point and would have a negligible effect on fisheries. Biomagnification of mercury in large fish high in the food chain is a problem in the Gulf of Mexico (sometimes associated with drilling discharges in the press), but the bioavailability and any association with trace concentrations of mercury in discharged drilling mud has not been demonstrated. Numerous studies have concluded that platforms do not contribute to higher mercury levels in marine organisms.

Produced Water

Produced-water discharges contain components and properties detrimental to fishery resources. Limited petroleum and metal contamination of sediments and the upper water column would occur out to several hundred meters or feet downcurrent from the discharge point. Offshore discharges of produced water would disperse, dilute to very near background levels within 1,000 m (3,280 ft) of the discharge point, and have a negligible effect on fisheries. Offshore live bottoms would not be impacted. Offshore discharges and subsequent changes to marine water quality would be regulated by a USEPA NPDES permits.

Hurricanes

The impacts of the 2005 hurricanes were discussed at length in Chapter 4.5.10 of the Multisale EIS. No significant storms have occurred in the Gulf of Mexico since that time. As a cumulative impacting factor, hurricanes certainly had a substantial impact on Gulf Coast fisheries in 2005 (primarily coastal resources such as oysters) and other storms of similar intensity are certainly a possibility in the future.

Future impacts to actual offshore fish resources and EFH could be expected to be minimal as they were in the cases of Hurricanes Katrina and Rita. Impacts to general coastal infrastructure and commercial fishing facilities would also be expected to be substantial in the face of similar strength storms in the future.

LNG Facilities

One additional cumulative impacting factor has been recently introduced as a possible significant impact to fisheries and offshore habitats in the future. This is the possibility of multiple offshore facilities for the offloading and regasification of liquefied natural gas (LNG) and the potential use of Gulf seawater for the warming process to convert the cold LNG to gas (known as the "open loop" technique). Additional details of potential impacts are discussed in Chapter 4.5.10 of the Multisale EIS. Only one LNG port facility has been fully approved and is operational at the time of this writing (Gulf Gateway Energy Bridge). This facility consists of a submerged turret and the first delivery was made in March 2005.

The true impacts of an open-loop system have yet to be determined, primarily due to the lack of information regarding the seasonal and vertical stratification of fish eggs and larva in the water column in relationship to open-loop water intakes. At this point in time, the cumulative impacts from future LNG facilities using an open-loop system will not be a consideration due to the likely continued permitting freeze of open-loop designs.

Other

Similar to the discussion of impacts to deepwater biological resources, an additional source of potentially huge impacts to fisheries and EFH should be mentioned—those associated with global climate change. This subject is too uncertain to discuss in detail at this time due to the wide-ranging scenarios from minor and fluctuating temperature changes with associated minimal sea-level rise of a few centimeters or inches over the next several decades to extremes of sea-level rise of 6 m (20 ft) and more. This higher level of impact is theoretically within the 40-year timeframe of the cumulative scenario analysis and would obviously have overwhelming impacts to shallower coastal fishery ecosystems. Water column depths overlying habitats on the shelf edge, such as the Flower Garden Banks, could increase by 35 percent, potentially impacts on corals. Proposed regionwide methods to sequester carbon (or other large-scale actions to reduce atmospheric CO_2) are likely in the distant future. Many of the scenarios include severe impacts of their own, such as deep-sea pH changes.

Summary and Conclusion

Activities resulting from the OCS Program and non-OCS events in the northern Gulf of Mexico have the potential to cause cumulative detrimental effects on fish resources and EFH. Impact-producing factors of the cumulative scenario that are expected to substantially affect fish resources and EFH include coastal and marine environmental degradation, overfishing, and to a lesser degree, coastal petroleum spills and coastal pipeline trenching. At the estimated level of cumulative impact, the resultant influence on fish resources and EFH is expected to be substantial, but not easily distinguished from effects due to natural population variations.

The incremental contribution of a proposed action's impacts on fish resources and EFH to the cumulative impact is small (as analyzed in Multisale EIS Chapters 4.2.1.1.8 for the WPA, 4.2.2.1.10 for the CPA, and 4.4.10 for accidental impacts). The effects of impact-producing factors (i.e., coastal and marine environmental degradation, petroleum spills, subsurface blowouts, pipeline trenching, and offshore discharges of drilling muds and produced waters) related to a CPA or WPA proposed action are expected to be negligible (resulting in less than a 1% decrease in fish populations or EFH) and almost undetectable among the other cumulative impacts. Even with consideration of an extreme year of major hurricane impacts to coastal wetlands in 2005, the cumulative impact of a CPA or WPA proposed action is expected to be negligible and undetectable.

The cumulative impact is expected to result in a less than 10 percent decrease in fish resource populations or EFH. It would require 2-3 generations for fishery resources to recover from 99 percent of the impacts. Recovery cannot take place from habitat loss (without unprecedented coastal reconstruction and wetlands restoration on an immense scale).

No significant new information was found that would alter the conclusion as described in the Multisale EIS that the incremental contribution of a CPA or WPA proposed action's impacts on fish resources and EFH to the cumulative impact is minimal. Furthermore, activity projected to result from the addition of the 181 South Area is negligible compared with total OCS activity, and it is not likely to result in a significant contribution to cumulative impacts.

4.1.12. Commercial Fishing

The MMS has reexamined the analysis for commercial fishing presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. New fishery statistics analyzed and the addition of the 181 South Area do not change the conclusion in the Multisale EIS that impacts on the commercial fisheries from the proposed action would be minimal.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Routine activities in the CPA and WPA such as seismic surveys and pipeline trenching would cause negligible impacts and will 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, a well blowout or an oil spill, associated with either a CPA or a WPA proposed action are anticipated to be minimal. Commercial fishermen are anticipated to avoid the area of a well blowout or an oil spill. Any impact on catch or value of catch would be insignificant compared with natural variability. The incremental contribution of a proposed action to the cumulative impacts on commercial fishing is small, and it is expected to be negligible and indiscernible from natural fishery population variability.

4.1.12.1. Description of the Affected Environment

A detailed description of commercial fishing can be found in Chapter 3.3.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

Commercial fishing regulations are very detailed and change on a regular basis depending on a variety of factors including stock assessment and catch statistics. Changes can occur on short notice, especially time closures based on allowable catch. Federal fishing regulations are not always the same as State fishing regulations. The Gulf of Mexico Fishery Management Council (GMFMC) provides the current information on commercial and recreational fishing rules for U.S. Federal waters of the Gulf of Mexico. The most recent rule updates were published in April 2007 (GMFMC, 2007).

The 181 South Area is located nearly 130 mi (209 km) from the nearest coastline. There are no special regulations designated within this area that would indicate any difference in the commercial fisheries that what is found in adjacent areas of the Gulf as described in the Multisale EIS.

Annual and monthly commercial fisheries landings statistics are available on the NMFS Internet site (USDOC, NMFS, 2007e). The following information is derived from various analyses of the available data queries at this site. The most recent, complete information on landings and value of fisheries for the U.S. was compiled by NMFS for 2006. Data from the 2004 data compilation is available in Chapter 3.3.1 of the Multisale EIS, and although the numbers for 2006 are slightly different for the total catch and its value, the general trends are unchanged. During 2006, commercial landings of all fisheries in the Gulf of Mexico totaled nearly 1.3 billion pounds, valued at nearly $663 million (USDOC, NMFS, 2007e). The Gulf of Mexico provides over 32 percent of the commercial fish landings by weight and 25 percent of all catch by monetary value in the continental U.S. (excluding Alaska) on an annual basis.

Menhaden, with landings of about 899 million pounds and valued at $41.2 million, was the most important Gulf of Mexico species in terms of quantity landed during 2006. Landings increased by 83 million pounds in the Gulf Coast States compared with landings in 2005. Shrimp, with landings of nearly

246 million pounds and valued at about $354 million, was the most important Gulf of Mexico species in terms of value landed during 2006. The 2006 Gulf of Mexico oyster fishery accounted for nearly 90 percent of the national total, with landings of 19.5 million pounds of meats valued at about $62 million. The Gulf of Mexico blue crab fishery accounted for about 41 percent of the national total, with landings of 66 million pounds valued at about $42.5 million (USDOC, NMFS, 2007e).

Texas's total commercial landings in 2006 were about 117 million pounds valued at over $197 million. Shrimp was the most valuable species group landed, with all shrimp species combined coming to a total weight of over 104 million pounds valued at over $167 million. In addition, during 2006, the Eastern oyster, red snapper, and black drum each accounted for landings valued at over $2 million. Blue crab landings were over $1.9 million (USDOC, NMFS, 2007e).

Louisiana's total commercial landings in 2006 were 911 million pounds valued at $269 million. Shrimp was the most important fishery landed, with about 135 million pounds valued at $145 million. In addition, during 2006, the following marine species each accounted for landings valued at over $2 million: Atlantic menhaden, blue crab, Eastern oyster, red snapper, and yellowfin tuna (USDOC, NMFS, 2007e).

Mississippi's total commercial landings in 2006 were 221.8 million pounds valued at nearly $22 million. Shrimp was the most important fishery landed, with 8.5 million pounds valued at $11.8 million. In addition, during 2006, the Atlantic menhaden catch was valued at $8.4 million (USDOC, NMFS, 2007e).

Alabama's total commercial fishery landings for 2006 were 33.7 million pounds valued at $49 million. Shrimp was the most important fishery, with about 23.9 million pounds landed valued at about $39.2 million. In addition, during 2006, the following species each accounted for landings valued at over $500 thousand: blue crab, Eastern oyster, sharks, red snapper, striped mullet, and Spanish mackerel (USDOC, NMFS, 2007e).

Total commercial landings for the west coast of Florida in 2006 were 69.7 million pounds valued at $146.8 million. Shrimp was the most important fishery landed, with 17 million pounds valued at $ 37.4 million. In addition, during 2006, the following species each accounted for landings valued at over $4 million: stone crab, blue crab, Eastern oyster, red grouper, gag, and Caribbean spiny lobster (USDOC, NMFS, 2007e)

Effects from the 2005 hurricanes have had substantial impacts on the oyster industry. It was initially believed that the 2005 hurricanes would have devastating effects on the health and numbers of offshore fish stocks in the Gulf of Mexico. Results of surveys conducted by NOAA indicate that shrimp and bottom fish catch per unit effort were within the range of past interannual variations (USDOC, NMFS, 2007b). The commercial fisheries landings of the Central Gulf Coast were drastically impacted by Hurricanes Rita and Katrina because of the severe impact on coastal port facilities and fishing vessels. These data are discussed in the Chapter 3.3.1 of the Multisale EIS.

In July 2007, NMFS published a preliminary report for 2006 on U.S. commercial and recreational fisheries (USDOC, NMFS, 2007e). Despite Louisiana's drop in the number of landings following Hurricane Katrina, Louisiana still remains the leader in Gulf landings, followed by Mississippi, Texas, Florida (West Coast), and Alabama. Kirkham (2007) states "though the migration into other state waters is not new, the post-storm NOAA statistics suggest a new trend: Fishers are taking more seafood from Louisiana waters than what is brought in to Louisiana ports" and "whether the trends will continue is up for debate. As docks, ramps, and icehouses in Louisiana come back online -- about 85 percent are back, according to a recent Wildlife and Fisheries report -- fishers will be able to bring their catch back to pre-storm ports and buyers" (Louisiana Dept. of Wildlife and Fisheries, 2007b).

Surveys conducted by NMFS after Hurricanes Katrina, Rita, and Wilma in 2005 showed clearly that the stock of all commercially important fish and invertebrate species were within interannual variation. A history of the problems experienced by the shrimp (i.e., white, brown, red, and seabob), crab (i.e., blue and stone), spiny lobster, and finfish industry and stocks are presented in Chapter 3.3.1 of the Multisale EIS.

Stock Status

The NMFS reports each year to the Congress and Fishery Management Councils on the status of all fish stocks in the nation. Nationwide, 81 percent of the fish stocks and stock complexes with known status are not subject to overfishing and 72 percent of the stocks and stock complexes with known status are not overfished. ("Overfished" is defined as a stock size that is below a prescribed biomass threshold. "Overfishing" is harvesting at a rate above a prescribed fishing mortality threshold.) The NMFS has increased the number of assessed stocks over the last several years, and this trend will continue. In 2004, NMFS completed 84 stock assessments, of which 10 were for stocks not previously assessed.

The number of commercial species designated to be overfished has been reduced from previous years. In 2006, only two major stock groups were overfished in the Gulf of Mexico: red snapper and greater amberjack. No other species were approaching overfished status (USDOC, NMFS, 2007b). A history of fish species considered overfished since 2001 is presented in Chapter 3.3.1 of the Multisale EIS.

4.1.12.2. Impacts of Routine Events

Background/Introduction

The detailed description of possible impacts on commercial fishing from routine activities associated with a CPA or WPA proposed action is given in Chapters 4.2.2.1.11 and 4.2.1.1.9 of the Multisale EIS, respectively. Because the 181 South Area is nearly 130 mi (209 km) from the nearest shore, it is not expected to contribute significantly to the indirect inshore impacts on fisheries discussed below.

Direct effects on commercial fishing 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. 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.

Production platform removal in water depths <200 ft (61 m) removes artificial reef habitat and often involves the use of explosives, which is lethal to fish that have internal air chambers (swim bladders), are demersal, or are in close association with the structure. Intense sounds generated by seismic surveys affect the spatial distribution of fish during and for some period following exposure.

The most commonly discharged offshore wastes are drill mud and produced water. Drill muds contain metals such as mercury and cadmium, which are toxic to fishery resources. Produced waters commonly contain brine, trace metals, hydrocarbons, organic acids, and radionuclides, all of which can be toxic to fisheries resources.

Additionally, routine offshore activities may impact inshore commercial fisheries indirectly. These activities include the construction or expansion of onshore facilities in wetland areas, pipeline emplacement in wetland areas, vessel usage of navigation channels and access canals, maintenance of navigation channels, and inshore disposal of OCS-generated petroleum-field wastes.

Degradation of coastal water quality may indirectly impact commercial fisheries. Coastal water quality, discussed at length in Chapters 4.2.1.1.2.1 and 4.2.2.1.2.1 of the Multisale EIS, may be affected adversely by saltwater intrusion and sediment disturbances from channel maintenance dredging, onshore pipeline emplacements, and canal widening. These factors potentially also affect the quality and quantity of wetlands and the quality of estuaries. Many commercial fish in the offshore Gulf of Mexico depend on these resources as nursery habitat.

Trash, discharges, and runoff may be released from onshore facilities and vessel traffic and may cause degradation of coastal water quality. Besides coastal sources, trash occurring in association with OCS operations and reaching coastal waters may impact water quality conditions.

Marine environmental degradation resulting from routine offshore activities also has the potential to indirectly affect commercial fish resources by reducing food stocks in soft-bottom and reef habitats. These routine activities include the offshore discharge of produced water and drilling muds.

CPA Proposed Action Analysis

The routine activities associated with a CPA proposed action that would impact commercial fisheries include installation of production platforms, underwater OCS obstructions, pipeline trenching, production platform removals, seismic surveys, and the discharge of offshore waste.

The number of production structures projected as a result of a CPA proposed action range from 28 to 40. Applying a 500-m (1,640-ft) safety zone around a platform would exclude approximately 193 ac (78 ha) from commercial fishing, assuming that the operator applied to USCG for a safety zone around the platform. The total number of platforms projected in water depths of <200 m (656 ft), the area of concentrated bottom trawling, is 22-24, thus potentially excluding 4,246-4,632 ac (<0.01%) from the total area available to trawling.

Commercial fisheries conflicts with platforms in water deeper than 200 m (656 ft), including those that may be installed in the 181 South Area, are limited to the longline fishery. Surface-drifting longlines may contact a deepwater platform if not set an appropriate distance from the surface-piercing structure. The area of surface-piercing structure is very small in relation to the total area available to longliners.

From 50 to 850 km (31 to 528 mi) of pipeline are anticipated to be laid in water depths <60 m (200 ft). In water depths beyond 60 m (200 ft), including the acreage in the 181 South Area, the projected length of pipeline is 90-1,355 km (56-842 mi). Gear loss from hang-on pipelines is mitigated by funds provided by the Fisherman's Compensation Fund. Because of pipeline burial requirements, it is assumed that installed pipelines will seldom conflict with bottom trawling activities in water depths <60 m (200 ft) and will not conflict with deeper waters, including water depths encountered in the 181 South Area.

Structural removals in water depths <200 m (656 ft) result in a loss of artificial habitat and in fish mortality when explosives are used. It is projected that 18-20 removals will result in the CPA in water depths <200 m (656 ft) as a result of a proposed action, making approximately 3,474-3,860 ac available again for commercial fishing. It is expected that structure removals will have a negligible impact on commercial fishing because of the inconsequential number of removals and the consideration that removals kill primarily those fish associated with the platforms.

Seismic surveys will occur in both shallow and deep waters of the CPA, including the 181 South Area. Seismic survey vessels are of temporary presence in any commercially fished area of the CPA. Temporal and spatial distributions of commercial species are not affected in adjacent areas. The locations and schedules of seismic surveys are published in the USCG's Local Notice to Mariners. Seismic surveys have a negligible impact on commercial fisheries.

Produced waters and drill muds are discharged in shallow and deep waters of the CPA, including the the 181 South Area. Studies of drill muds and produced waters from platforms show that the plume disperses rapidly in both cases and does not pose a threat to commercial fisheries.

Indirect impacts detailed above from offshore operations have an impact on commercial fishery resources that cannot be discerned from direct impacts of inshore activities. Indirect impacts from the 181 South Area are negligible because of its distance from the nearest shoreline (130 mi or 209 km).

WPA Proposed Action Analysis

The routine activities associated with a WPA proposed action that would impact commercial fisheries include installation of production platforms, underwater OCS obstructions, pipeline trenching, production platform removals, seismic surveys, and the discharge of offshore waste.

The number of production structures projected as a result of a WPA proposed action range from 28 to 41. Applying a 500-m (1,640-ft) safety zone around a platform would exclude approximately 193 ac (78 ha) from commercial fishing, assuming that the operator applied to USCG for a safety zone around the platform. The total number of platforms projected in the CPA in <200 m (656 ft), the area of concentrated bottom trawling, is 23-33, thus potentially excluding 4,439-6,369 ac (<0.01%) from the total area available to trawling.

Commercial fisheries conflicts with platforms in water deeper than 200 m (656 ft) are limited to the longline fishery. Surface-drifting longlines may contact a deepwater platform if not set an appropriate distance from the surface-piercing structure. The area of a surface-piercing structure is very small in relation to the total area available to longliners.

The number of kilometers of pipeline projected to be laid in the WPA in water depths <60 m (200 ft) is from 60 to 420 km (37 to 261 mi). In water depths beyond 60 m (200 ft), the projected length of pipeline is unavailable. Because of pipeline burial requirements, it is assumed that installed pipelines will seldom conflict with bottom trawling activities in water depths <60 m (200 ft), and it will not conflict with commercial fishing in deeper waters.

Structural removals in water depths <200 m (656 ft) result in a loss of artificial habitat and in fish mortality when explosives are used. It is projected that 15-24 removals will result in the WPA in water depths <200 m (656 ft) as a result of a proposed action, making approximately 3,667-4,632 ac available again for commercial fishing. It is expected that structure removals will have a negligible impact on commercial fishing because of the inconsequential number of removals and the consideration that removals kill primarily those fish associated with the platforms.

Seismic surveys will occur in both shallow and deep waters of the WPA. Seismic survey vessels are of temporary presence in any commercially fished area of the WPA. Temporal and spatial distributions of commercial species are not affected in areas adjacent to seismic surveys. The locations and schedules of seismic surveys are published in the USCG's Local Notice to Mariners. Seismic surveys have a negligible impact on commercial fisheries.

Produced waters and drill muds are discharged in shallow and deep waters of the WPA. Studies of drill muds and produced waters from platforms show that the plume disperses rapidly in both cases and does not pose a threat to commercial fisheries.

Indirect impacts detailed above from offshore operations have an impact on commercial fishery resources that cannot be discerned from direct impacts of inshore activities.

Summary and Conclusion

Routine activities such as seismic surveys and pipeline trenching in the CPA and WPA would cause negligible impacts and will not deleteriously affect commercial fishing activities. Seismic surveys are not expected to cause long-term or permanent displacement of any listed species from critical habitat/preferred habitat or to result in the destruction or adverse modification of critical habitat or essential fish habitat. Operations such as production platform emplacement, underwater OCS impediments, and explosive platform removal would cause slightly greater impacts on commercial fishing, although their effects are localized and temporary. Commercial fisheries conflicts with platforms in water deeper than 200 m (656 ft), including those installed in the 181 South Area, are limited to the longline fishery. The area of surface-piercing structure in this area is, however, very small in relation to the area available to longliners. Indirect impacts to inshore habitats are negligible and indistinguishable from direct impacts of inshore activities on commercial fisheries.

The MMS has reexamined the impacts of CPA and WPA activities on the commercial fisheries resources. A search was conducted for new information published since completion of the Multisale EIS. A search of Internet information sources (including scientific journals), as well as interviews with personnel from academic institutions and governmental resource agencies, was conducted to determine the availability of new information.

Commercial catches by species and by State have been updated in **Chapter 4.1.12.1**, as have the impacts of the 2005 hurricanes on fish and fish habitat from recent reports (USDOC, NMFS, 2007e and f). Also included in the new information examined was the inclusion of the 181 South Area to the analysis. New information was not significantly different from that provided in the Multisale EIS and therefore no information was found that would alter the conclusion in the Multisale EIS that impacts on the commercial fisheries from routine activities associated with a CPA or WPA proposed action would be minimal.

4.1.12.3. Impacts of Accidental Events

Background/Introduction

The description of possible impacts on commercial fisheries resulting from accidental events associated with a WPA or a CPA proposed action is presented in detail in Chapter 4.4.10 of the Multisale EIS. Accidental events that would impact commercial fisheries include subsurface offshore blowouts and oil spills, both inshore and offshore.

A subsurface blowout event, although highly unlikely, has the potential to affect fish within a few hundred meters or feet of the blowout. A blowout at the seafloor can cause a crater that might interfere with longlining in the near vicinity or cause a limited area to be closed to longlining.

A seafloor blowout could also result in a localized increase in suspended sediments. These sediments can clog finfish gills and interfere with respiration. Sediments remaining in suspension can cause interference in feeding in finfish species that are sight feeders. Coarse sediments such as sand-sized particles, however, will fall out of the water column quickly, and finer sediments are redistributed by currents and settle out over a larger area.

Oil spills are rare from a blowout. Most product loss from blowouts is natural gas, primarily methane, which rapidly dissolves in the water column or escapes into the air.

The risk of oil-spill events as a result of a CPA or WPA proposed action was discussed at length in Chapter 4.3.1 of the Multisale EIS, and the potential effects of a spill on commercial fisheries is discussed at length in Chapter 4.4.10 of the Multisale EIS.

Oil has the potential to affect finfish through direct ingestion of hydrocarbons or ingestion of contaminated prey, through uptake of dissolved petroleum products through the gills and epithelium of adults and juveniles, and through the death of eggs and decreased survival of larvae (NRC, 1985 and 2002). All of these mechanisms are discussed at length in Chapter 4.4.10 of the Multisale EIS.

Oil spilled in the offshore areas is usually localized and has a very low probability of reaching coastal areas that serve as nursery ground for many commercial fish. Much of the oil volatilizes or is dispersed by currents in the offshore environment.

Oil produced from the 181 South Area is anticipated to have a high concentration of heavy hydrocarbon compounds and, thus, it is projected to linger in the environment longer than oil from other areas composed of more volatiles. As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. Because it is located about 130 mi (209 km) from the nearest shore, oil spills from the 181 South Area would not impact inshore estuaries.

CPA Proposed Action Analysis

The accidental events that would impact commercial fisheries include well blowouts, primarily gas well blowouts and oil spills.

Impacts of gas well blowouts on commercial fisheries are very localized and limited. Cratering and sediment redistribution would affect only the area within a few hundred yards or meters of the blowout. Commercial fishermen would avoid fishing any cratered area that would interfere with longlining.

Commercial fishermen would also actively avoid the area of a spill. Fish flesh tainting (oily tasting fish), closure of an area due to tainting, or the perception of tainting commercial catches may prevent fishermen from working in an area, which could decrease commercial landings value or catch. At the expected level of impact, the impact on commercial fisheries from a CPA proposed action would not be perceptible against natural background variation.

As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. If a spill were to occur, however, the higher concentration of heavy hydrocarbons would potentially cause the oil to linger in the environment longer than lighter crude oil. This might result in a slightly larger area of affected environment. The effect on catch or value of commercial species, however, is not anticipated to be large enough to discern from natural population variability.

WPA Proposed Action Analysis

The accidental events that would impact commercial fisheries include well blowouts, primarily gas well blowout and oil spills.

Impacts of gas well blowouts on commercial fisheries are very localized and limited. Cratering and sediment redistribution would affect only the area with a few hundred yards or meters of the blowout. Commercial fishermen would avoid fishing any cratered area that would interfere with longlining.

Commercial fishermen would also actively avoid the area of a spill. Fish flesh tainting (oily tasting fish), closure of an area due to tainting, or the perception of tainting commercial catches may prevent fishermen from working in an area, which could decrease commercial landings value or catch. At the expected level of impact, the impact on commercial fisheries from a WPA proposed action would not be perceptible against natural background variation.

Summary and Conclusion

In summary, the potential impacts from accidental events, a well blowout or an oil spill, associated with either a CPA or WPA proposed action are anticipated to be minimal. Commercial fishermen are anticipated to avoid the area of a well blowout or an oil spill. Any impact on catch or the value of catch would be insignificant compared with natural variability.

An increased risk of a large oil spill (≥1,000 bbl) occurring is not anticipated; therefore, the inclusion of the 181 South Area is anticipated to have minimal effects on commercial fisheries (longliners).

The new information on commercial catches and their value since 2005 were considered, as well as the inclusion of the 181 South Area. New information was not significantly different from that provided in the Multisale EIS and therefore no information was found that would alter the conclusions in the Multisale EIS that impacts on the commercial fisheries from accidental events associated with a CPA or WPA proposed action would be minimal.

4.1.12.4. Cumulative Impacts

Background/Introduction

A detailed description of cumulative impacts on commercial fishing can be found in Chapter 4.5.11 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Specific types of impact-producing factors considered in the cumulative analysis include commercial fishing techniques or practices, hurricanes, installation of production platforms, underwater OCS obstructions, production platform removals, seismic surveys, petroleum spills, subsurface blowouts, pipeline trenching, and offshore discharges of drilling muds and produced waters.

Competition between large numbers of commercial fishermen, between commercial operations employing different fishing methods, and between commercial and recreational fishermen for a given fishery resource, as well as natural phenomena such as hurricanes, hypoxia, and red or brown tides, may impact commercial fishing activities. Fishing techniques such as trawling, gill netting, or purse seining, when practiced nonselectively, may reduce the standing stocks of the desired target species as well as significantly impact species other than the target. In addition, continued fishing of most commercial species at the present levels may result in rapid declines in commercial landings and the eventual failure of certain fisheries. Finally, hurricanes may impact commercial fishing by damaging gear and shore facilities and by dispersing resources over a wide geographic area. The availability and price of key supplies and services, such as fuel, can also affect commercial fishing.

Seismic surveys will occur in both shallow and deepwater areas of the Gulf of Mexico. Usually, fishermen are precluded from a very small area for several days. This should not significantly impact the annual landings or the value of landings for commercial fisheries in the Gulf. Gulf of Mexico species can be found in many adjacent locations, and Gulf commercial fishermen do not fish in one locale.

The potential causes, sizes, and probabilities of petroleum spills that could occur during activities associated with a CPA or WPA proposed action are discussed in detail in **Chapter 4.3.1**. One large (≥1,000 bbl) offshore spill is estimated to occur annually from all sources Gulfwide. The impact of OCS-related spills in the cumulative area is not expected to cause a discernible decrease in commercial catch.

The impact of non-OCS-related spills in this area is not expected to cause a decrease in commercial fishing local to the spill area. At the expected level of impact, the resultant influence on commercial fishing, landings, or the value of those landings is not expected to be distinguished from natural population variations.

Subsurface blowouts of both oil and natural gas wells and pipeline trenching have the potential to adversely affect commercial fishery resources. The loss of well control and resultant blowouts seldom occur in the Gulf OCS (6 blowouts per 1,000 well starts; <10% would result in some spilled oil). Blowouts can resuspend sediment locally, and natural gas well blowouts release methane into the water column. Methane is quickly dispersed from the water column.

Pipeline trenching also has the potential to affect commercial fisheries as a result of sediment suspension. Sandy sediments from either source would be quickly redeposited within 400 m (1,312 ft) of the trench, and finer sediments would be widely dispersed and redeposited over a period of hours to days within a few thousand meters (yards) of the event. No significant impact to commercial fisheries is therefore anticipated as a result of oil or gas well blowouts or pipeline trenching. Resuspension of vast amounts of sediments as a result of large storms and hurricanes occurs on a regular basis in the northern Gulf of Mexico (Stone et al., 1996). The cumulative effect on commercial fisheries from oil and gas well blowouts in the Gulf OCS and pipeline trenching is not expected to be distinguishable from natural events or natural population variations.

Drilling-mud discharges contain chemicals toxic to marine fishes including brine, hydrocarbons, radionuclides, and metals; however, this is only at concentrations many orders of magnitude higher than those found more than a few meters or feet from the discharge point. Offshore discharges of drilling muds would dilute to very near background levels within 1,000 m (3,281 ft) of the discharge point and would have a negligible cumulative effect on fisheries.

Produced-water discharges contain components and properties detrimental to commercial fishery resources. Offshore discharges of produced water would disperse, dilute to very near background levels within 1,000 m (3,281 ft) of the discharge point, and have a negligible cumulative effect on fisheries.

Commercial fisheries landings of the Central Gulf Coast were drastically impacted by Hurricanes Katrina and Rita in 2005 as a result of the severe impact on coastal port facilities and fishing vessels. These data are discussed in detail in Chapter 3.3.1 of the Multisale EIS. This was clearly the most destructive impact to commercial fishing infrastructure in U.S. history, but there are also many indications that these levels of impacts could reoccur. Natural disaster impacts are easily distinguished from incremental impacts of the OCS activities.

Commercial catches by species and by State have been updated in **Chapter 4.1.12.1,** as have the impacts of the 2005 hurricanes on fish and fish habitat from recent reports (USDOC, NMFS, 2007e and f). Also included in the new information examined was the inclusion of the 181 South Area to the analysis. New information was not significantly different from that provided in the Multisale EIS and therefore no information was found that would alter the conclusion in the Multisale EIS that cumulative impacts on the commercial fisheries would be minimal.

Summary and Conclusion

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

Recent substantial impacts were because of the 2005 hurricanes. At the estimated level of cumulative impact, the resultant influence on commercial fishing, landings, and the value of those landings is expected to be substantial and easily distinguished from effects due to natural population variations.

The effects of impact-producing factors (i.e., installation of production platforms, underwater OCS obstructions, production platform removals, seismic surveys, oil spills, subsurface blowouts, pipeline trenching, and offshore discharges of drilling muds and produced waters) related to a CPA or WPA proposed action are expected to be negligible and indiscernible from natural fishery population variability.

New fishery statistics analyzed and the addition of the 181 South Area do not change the conclusion in the Multisale EIS that the incremental contribution of a CPA or WPA proposed action to cumulative impacts on the commercial fisheries would be negligible and indiscernible from natural fishery population variability.

4.1.13. Recreational Fishing

Recreational fishing continues to be a popular nearshore and near offshore recreational activity in the northeastern and central Gulf of Mexico. The MMS has reexamined the analysis for recreational fishing presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. New information was not significantly different from that provided in the Multisale EIS and therefore no information was found that would alter the conclusions in the Multisale EIS that impacts on the recreational fisheries from accidental events associated with a CPA or WPA proposed action would be minimal. The inclusion of 181 South Area will have no direct routine impacts on recreational fishing due to its distance (nearly 130 mi; 209 km) from the nearest shore. Indirect impacts resulting from an incremental increase of vessel trips from activities in the 181 South Area is expected to be negligible.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Routine activities in the CPA and WPA such as seismic surveys and pipeline trenching would cause negligible impacts and will not deleteriously affect recreational fishing activities. Indirect impacts to inshore habitats are negligible and indistinguishable from direct impacts of inshore activities on commercial recreational fisheries. Temporary localized impacts from oil spills are anticipated as a result of a CPA or WPA proposed action, which would include temporary inconvenience to recreational fishermen and possibly some loss of revenue to facilities supported by recreational fishermen such as boat launches and bait shops. The incremental contribution of a CPA or WPA proposed action to the cumulative impact on recreational fishing is positive, although minor, due to the relatively small number of structures projected.

4.1.13.1. Description of the Affected Environment

The primary source for marine recreational fisheries data in U.S. waters is the Marine Recreational Fisheries Statistics Survey (MRFSS) conducted by NMFS. This recreational fisheries data from the Gulf of Mexico through 2005 (USDOC, NMFS, 2006) is summarized below, and it presented in detail in Chapter 3.3.2 and Tables 3-12, 3-13, and 3-14 of the Multisale EIS. Since the publication of the Multisale EIS, NMFS has published the 2006 MRFSS (USDOC, NMFS, 2007g), which is presented in **Tables 4-6 through 4-8**. These 2005 and 2006 data are inclusive of the 181 South Area.

In 2006, 3.6 million residents participated in marine recreational fishing. All participants, including visitors, took nearly 25 million trips and caught almost 193 million fish. About 65 percent of the trips were made in west Florida, followed by 18 percent in Louisiana, almost 9 percent in Alabama, over 4 percent in Texas, and 4 percent in Mississippi. From 2005 to 2006, the number of recreational fishing trips from Mississippi decreased by 36 percent, while the number of trips from Alabama increased by 37 percent. Florida, Louisiana, and Texas saw smaller increases in the number of trips.

In 2006, over 6.1 million people, up from 5.6 million in 2005, engaged in some form of recreational fishing in Louisiana, Mississippi, Alabama, and western Florida. Of the four states, western Florida had the highest number of anglers and fishing trips in 2005 and 2006, followed (in descending order by number of trips) by Louisiana, Alabama, and Mississippi. The most common mode of fishing in three Gulf Coast States was private/rental boats, comprising over 60 percent in Louisiana and Mississippi, and 26 percent in West Florida; the most popular form in Alabama was shore ocean (<3 mi or 4.8 km) at 39 percent. In 2005, the most common mode of fishing in all Gulf Coast States was private/rental boats, comprising over 50 percent of the trips in each State.

In 2005 and 2006, the percentage of effort expended in inland, State, and Federal waters varied by state. In Mississippi and Louisiana, approximately 90 percent of the trips were made in inland waters as opposed to State and Federal ocean waters in both 2005 and 2006. In West Florida and Alabama, the percentage of trips made in State ocean waters (46% and 51%, respectively) was much higher than the other two states. These percentages increased by 7 percent and 6 percent, respectively, from 2005.

The top species commonly caught by recreational fishers in the MRFSS Gulf Coast States are illustrated in **Table 4-6**. By number, herring and spotted sea trout, both inland species, were the most common fish caught by recreational anglers in the Gulf of Mexico during 2005 and 2006. In 2006, the estimated catch for herrings was over 41 million fish, up from 24 million in 2005; while anglers caught over 30 million spotted sea trout, up from 23 million in 2005. Other important inland species include red drum, saltwater catfishes, and pinfishes. In offshore oceanic waters of the Gulf of Mexico, the most important species in terms of pounds caught were red drum, red snapper, and sheepshead.

Hurricanes Katrina and Rita impacted recreational fishing from the Florida Panhandle to the Texas border, with additional impacts felt in southern Florida. The hurricanes had a major impact on the supporting infrastructure that anglers require to go fishing (e.g., bait shops, docks and marinas, lodging, fuel and ice facilities, etc.). In addition to damages to boats and facilities, revenue losses associated with lost markets of products or services are occurring. When considered on a regional basis, these lost market channels constitute a considerable reduction in the levels of economic activity, income generation, employment creation, and tax collections.

Storm-related, recreational fisheries losses over the next year could total $421 million at the retail level (Louisiana Dept. of Wildlife and Fisheries, 2007). This figure includes losses incurred by licensed charter and guide vessels operating in the severely affected Louisiana parishes.

In addition, Hurricanes Katrina and Rita deposited extensive amounts of debris over various areas of the Gulf Coast (USDOC, NOAA, 2007). Submerged marine debris poses a hazard to vessel traffic. The NOAA is conducting underwater surveys off the coasts of Louisiana, Mississippi, and Alabama. This information is being used by State and Federal agencies tasked with removing marine debris left by Hurricane Katrina, and it will aid in planning for the aftermath of future storms.

4.1.13.2. Impacts of Routine Events

Background/Introduction

A detailed description of routine impacts on recreational fishing associated with a CPA or WPA proposed action can be found in Chapters 4.2.2.1.12 and 4.2.1.1.10 in the Multisale EIS, respectively.

Routine events that might have direct effects on recreational fishing activity include structures installed on productive leases, platform removal, seismic surveys, drilling activities and pipeline trenching, drilling rig and platform discharges, and marine vessel traffic.

Structures placed on productive leases provide hard substrate for invertebrate communities as food supply to attract provide shelter for fish. Each structure placed in the Gulf of Mexico to produce oil or gas would function as an artificial reef, attract sport fish, and improve fishing prospects in the immediate vicinity of platforms. This impact would last for the life of the structure, i.e., until the structures are removed from the location and the marine environment.

Platform removal in <60 m (<200 ft) of water is usually accomplished by the use of explosives that are lethal to fish with internal air chambers, are demersal, or are in close contact with the platform structure. Seismic surveys generate intense sounds that affect the spatial distribution of fish during the surveys and for some period after exposure. Drilling activities and pipeline trenching provide temporary space-use conflicts with recreational fishermen.

In additional, drilling rigs and permanent platforms discharge drilling mud and produced waters, respectively. Drill muds contain metals such as mercury and cadmium, and produced waters contain trace metals, brine, hydrocarbons, and radionuclides. Marine vessel traffic is increased for each productive platform established.

Routine offshore activities also may impact inshore recreational fish stocks since most species are dependent on the inshore bays and wetlands for juvenile recruitment, growth, and/or survival. These activities include the construction or expansion of onshore facilities in wetland areas, pipeline emplacement in wetland areas, vessel usage of navigation channels and access canals, maintenance of navigation channels, and inshore disposal of OCS-generated petroleum-field wastes.

Degradation of inshore water quality including discharges, trash, and runoff that may be released from onshore facilities may indirectly impact recreational fisheries and impacts to coastal water quality. Coastal water quality in relation to commercial fisheries is discussed in Chapters 4.2.1.1.2.1 and 4.4.2.1 of the Multisale EIS and in **Chapter 4.1.2.1.2** of this SEIS.

CPA Proposed Action Analysis

Routine impacts to recreational fisheries that would occur as a result of a CPA proposed action include installation of platforms, platform removal, seismic surveys, drilling activities and pipeline trenching, drilling rig and platform discharges and marine vessel traffic.

A CPA proposed action is anticipated to result in the installation of 22-24 new production platforms in water depths <200 m (656 ft) and would have beneficial effects on offshore and deep-sea recreational fishing within developed leases accessible to fishermen. These structures provide hard substrate that support food organisms, provide shelter, and attract fish. These positive effects would accrue and would last until the production structures are removed from the marine environment.

Structural removals of platforms in water depths <200 m (656 ft) result in a loss of artificial habitat and result in fish mortality when explosives are used. It is projected that 18-20 removals will result in the CPA in water depths <200 m (656 ft). It is expected that structure removals will have a negligible impact on recreational fishing because of the inconsequential number of removals and the consideration that removals kill primarily those fish associated with the platforms

Seismic surveys vessels are of temporary presence in any recreationally fished area of the CPA. Temporal and spatial distributions of species are not affected in adjacent areas.

Space-use conflicts could occur during the time that any platform or pipeline is being installed. The length of pipeline anticipated as a result of a CPA proposed action is 50-850 km (31-528 mi) in water depths <60 m (200 ft). These impacts are short term and considered negligible on the recreational fishing community.

Platform discharges are small in volume and quickly diluted, and they do not significantly impact recreational fisheries. Impacts on recreational fishing because of OCS-related vessel wakes would be minor because, on average, vessel use associated with a CPA proposed action would represent <1 percent of total vessel use.

The inclusion of the 181 South Area will have no direct routine impacts on recreational fishing due to its distance (nearly 130 mi or 209 km) from the nearest shore. Indirect impacts resulting from an incremental increase of vessel trips from activities in the 181 South Area is expected to be negligible.

WPA Proposed Action Analysis

Routine impacts to recreational fisheries that would occur as a result of a WPA proposed action include installation of platforms, platform removal, seismic surveys, drilling activities and pipeline trenching, drilling rig and platform discharges and marine vessel traffic.

A WPA proposed action is anticipated to result in the installation of 23-33 new production platforms in water depths <200 m (656 ft) and would have beneficial effects on offshore and deep-sea recreational fishing within developed leases accessible to fishermen. These structures provide hard substrate that supports food and shelter and attracts fish. These positive effects would accrue and would last until the production structures are removed from the marine environment.

The structural removal of platforms in water depths <200 m (656 ft) results in a loss of artificial habitat and results in fish mortality when explosives are used. It is projected that 10-16 removals will result in the WPA in water depths <200 m. It is expected that structure removals will have a negligible impact on recreational fishing because of the inconsequential number of removals and the consideration that removals kill primarily those fish associated with the platforms.

Seismic survey vessels are of temporary presence in any recreationally fished area of the WPA. Temporal and spatial distributions of species are not affected in adjacent areas.

Space-use conflicts could occur during the time that any platform or pipeline is being installed. The length of pipeline anticipated as a result of a WPA proposed action is 60-420 km (37-261 mi) in water depths <60 m (200 ft). These impacts are short term and considered negligible on the recreational fishing community.

Platform discharges are small in volume and quickly diluted, and they do not significantly impact recreational fisheries. Impacts on recreational fishing because of OCS-related vessel wakes would be minor because, on average, vessel use associated with a WPA proposed action would represent <1 percent of total vessel use.

Summary and Conclusion

Routine activities such as seismic surveys and pipeline trenching in the CPA and WPA would cause negligible impacts and will not deleteriously affect recreational fishing activities. Seismic surveys are not expected to cause long-term or permanent displacement of any recreationally fished species. Operations such as production platform emplacement, underwater OCS impediments, and explosive platform removal will not cause significant impacts to recreational fishing because their effects are localized and temporary. Recreational fisheries conflicts with platforms in the 181 South Area are not anticipated because its distance to the nearest shoreline is 130 mi (209 km). Indirect impacts to inshore habitats are negligible and indistinguishable from direct impacts of inshore activities on recreational fisheries.

The MMS has reexamined the analysis for recreational fishing presented in the Multisale EIS based on the updated information presented. Specifically included in the reexamination was the addition of the 181 South Area to the analysis. No significant new information was found that would alter the impact conclusion for recreational fishing presented in the Multisale EIS; therefore, a new analysis of the potential impacts of a CPA or WPA proposed action on recreational fishing is not required. The analysis and potential impacts detailed in the Multisale EIS still apply for a CPA or WPA proposed action. Significant impacts to recreational fisheries will not result from either a CPA or a WPA proposed action.

4.1.13.3. Impacts of Accidental Events

Detailed information of the possible impacts on recreational fisheries from accidental events associated with a CPA or WPA proposed action are discussed in detail in Chapter 4.4.11 of the Multisale EIS. Accidental events that could possibly impact recreational fisheries are oil spills that occur within approximately 100 mi (161 km) of shore, which is where most recreational fishing takes place. Oil spilled in the offshore areas is usually localized and has a very low probability of reaching coastal areas that serve as nursery ground for many species of finfish. Much of the oil volatilizes or is dispersed by currents in the offshore environment. The 181 South Area is nearly 130 mi (209 km) from the nearest shore, and therefore has no discernible impact on recreational fishery resources.

The probability of an offshore oil spill event is very low, as detailed in Chapter 4.3.1.5 of the Multisale EIS. Spills in coastal waters, as discussed in Chapter 4.3.1.7 of the Multisale EIS, 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 and rivers, and through coastal bays.

Oil has the potential to affect finfish through direct ingestion of hydrocarbons or ingestion of contaminated prey, through uptake of dissolved petroleum products through the gills and epithelium of adults and juveniles, and through the death of eggs and decreased survival of larvae (NRC, 1985 and 2002). All of these mechanisms are discussed in detail in Chapter 4.4.10 of the Multisale EIS.

CPA Proposed Action Analysis

The accidental events that could potentially cause impacts on the recreational fishery are nearshore oil spills. The impacts from the size of oil spills projected within the area used by recreational fishermen in the CPA would be temporary and localized. Recreational fishermen would routinely avoid the area of a spill or an inshore grounding of a spill because of the oil and cleanup operations. This could result in inconvenience to fishermen and temporary loss of revenue for inshore facilities dependent on recreational fishermen, such as boat launches or bait shops.

No impact to recreational species catch is anticipated from the addition of the 181 South Area because of its distance to the nearest shore.

WPA Proposed Action Analysis

The accidental events that could potentially cause impacts on the recreational fishery are nearshore oil spills. The impacts from the size of oil spills projected within the area used by recreational fishermen in the WPA would be temporary and localized. Recreational fishermen would routinely avoid the area of a spill or an inshore grounding of a spill because of the oil and cleanup operations. This could result in inconvenience to fishermen and temporary loss of revenue for inshore facilities dependent on recreational fishermen, such as boat launches or bait shops.

Summary and Conclusion

In summary, only temporary localized impacts from oil spills are anticipated as a result of a CPA or WPA proposed action. These impacts include temporary inconvenience to recreational fishermen and possibly some loss of revenue to facilities supported by recreational fishermen, such as boat launches and bait shops. No impacts are anticipated from the addition of the 181 South Area because of its nearly 130-mi (209-km) distance to the nearest shore.

The new information presented regarding recreational fishing activity and the inclusion of the 181 South Area were considered. New information was not significantly different from that provided in the Multisale EIS and therefore no information was found that would alter the conclusions in the Multisale EIS that impacts on the recreational fisheries from accidental events associated with a CPA or WPA proposed action would be minimal.

4.1.13.4. Cumulative Impacts

Background/Introduction

A detailed description of cumulative impacts on recreational fishing can be found in Chapter 4.5.12 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

This cumulative impact analysis considers existing recreational fishing activity, artificial reef developments, fishery management regimes, and past and future oil and gas developments. Sport fishing is a very popular recreational activity throughout the Gulf of Mexico and is one of the major attractions that generate significant tourism economies along the Louisiana, Alabama, and Florida coastal areas. The latest information indicates participation in marine recreational fishing in the Gulf of Mexico has shown a generally increasing trend from 2000 through 2006 (USDOC, NMFS, 2007g). The 181 South Area is not an area of significant recreational fishing due to its distance of nearly 130 mi (209 km) from the nearest shore.

National concern for the health and sustainability of marine fisheries led to Federal legislation that resulted in the development of fishery management plans affecting recreational fish species in the Gulf of Mexico. Fisheries management plans focused on targeted species, such as red snapper, have led to size and creel limits as well as seasonal closures and gear restrictions or modifications in both commercial and recreational fishing.

The Gulf Coast States have aggressively supported artificial reef development programs to help encourage and increase interest and enjoyment in offshore recreational fishing. With the exception of structures located deep water, most structures associated with a proposed action would act as artificial reefs and would attract recreational fishermen.

Other cumulative impacts to recreational fisheries from routine OCS operations include space-use conflicts and noise from rig and platform installation and removal in the OCS. Space-use conflicts are usually minimal, but there is recreational shrimp trawling for wild shrimp, and trawls can become entangled with OCS structures in the water. Recreational rod and reel anglers often target oil and gas platforms because these structures act as Fish Attraction Devices (FAD's). Noise from rig and platform installation may scatter some groundfish away from their homing area, possibly resulting in a temporary decrease in recreational catch, but most fish will return once the noise quits. Platform removal using explosives may impact recreational fisheries by driving some fish away or killing them. A structure that may be targeted as a fishing location by recreational anglers could be eliminated.

Non-OCS activities also have the potential to adversely affect recreational fisheries, with most impacts occurring in nearshore coastal waters. Recreational fisheries may be affected by coastal development, commercial fishing, and dredge-and-fill activities.

Oil spills can affect recreational fishers in ways similar to those stated for commercial fishers—fouling gear with oil, tainting the catch, and degrading water quality and fishing grounds—all of which could occur as a result of either OCS or non-OCS cumulative activities. Spills are unlikely to decrease recreational fishing activity but may divert the location or timing of a few planned fishing trips and result in the loss of income to local businesses that are dependent on recreational fishermen, such as bait shops and boat launches.

The OCS oil spills most likely to affect recreational anglers would be the shallow water spills since the recreational anglers are less likely to venture far offshore. Most recreational fishing is conducted within 100 mi (161 km) of shore. It is unlikely that all of these assumed spills will occur inshore.

New information available (USDOC, NMFS, 2007g) was used to update the recreational fishing statistics from those presented in the Multisale EIS. These data and the addition of the 181 South Area were considered. The new data do not alter the conclusion of that presented in the Multisale EIS that cumulative impacts resulting from a CPA or WPA proposed action are minor.

Summary and Conclusion

Recreational fishing continues to be a popular nearshore and near offshore recreational activity in the northeastern and central Gulf of Mexico. The incremental contribution of a CPA or WPA proposed action to the cumulative impact on recreational fishing is positive, although minor, due to the relatively small number of structures projected.

The cumulative impacts to recreational fisheries include space-use conflicts, noise from rig and platform installation, and oil spills in the OCS. Non OCS activities with the potential for cumulative impacts on recreational fisheries include coastal development, commercial fishing, dredge-and-fill activities, and inshore oil spills.

New information used to update the recreational fishing statistics from those presented in the Multisale EIS were considered, as well as the addition of the 181 South Area. These new data do not alter the conclusion of that presented in the Multisale EIS that cumulative impacts resulting from a CPA or WPA proposed action are minor.

4.1.14. Recreational Resources

The MMS has reexamined the analysis for recreational resources presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for recreational resources presented in the Multisale EIS. The 181 South Area is located nearly 130 mi (209 km) from the nearest coast, far distant from recreational beaches, out of sight from land, and out of range for most recreational fishing. The inclusion of the 181 South Area is projected to result in a relatively minor amount of additional activity, limiting potential impacts from traffic and from trash and debris. The locations of the 181 South Area and the limited activities that are expected to result also limit potential impacts from oil spills. Therefore, no additional impacts on recreational resources are projected as a result of the addition of the 181 South Area.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. While marine debris and nearshore operations, either individually or collectively, may adversely affect the quality of some recreational experiences, they are unlikely to reduce the number of recreational visits to Gulf Coast beaches. It is unlikely that a spill would be a major threat to recreational beaches because any impacts would be short term and localized, and should have no long-term effect on tourism. The incremental contribution of the CPA and WPA proposed actions to cumulative impacts to recreational resources would be minor.

4.1.14.1. Description of the Affected Environment

A detailed description of recreational resources can be found in Chapter 3.3.3 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS and the addition of the 181 South Area to the proposed CPA sale area. Because the 181 South Area is on the eastern edge of the CPA sale area nearly 130 mi (209 km) from the nearest coast and because it is expected to result in very limited additional activity, the 181 South Area would add little to the impacting factors relevant to recreational resources (e.g., traffic and oil spills).

The northern Gulf of Mexico coastal zone is one of the major recreational regions of the U.S., particularly in connection with marine fishing and beach-related activities. The shorefronts along the Gulf Coasts of Florida, Alabama, Mississippi, Louisiana, and Texas offer a diversity of natural and developed landscapes and seascapes. The MMS defines major recreational beaches as those frequently visited sandy areas along the shoreline that are exposed to the Gulf of Mexico and that support a multiplicity of recreational activities. Included are Gulf Islands National Seashore, State parks and recreational areas, county and local parks, urban beaches, private resort areas, and State and private environmental preservation and conservation areas.

Recreation and tourism are major sources of employment along the Gulf Coast. **Table 4-9** presents employment in tourism-related industries in 2005. The data in **Table 4-9** are a compilation of data from travel- and tourism-related industries in the County Business Patterns (USDOC, Bureau of the Census, 2007).

Employment data are assumed to be in various travel-related industries, including food and beverage stores, gas stations, general merchandise stores, passenger air transportation, transit and ground passenger transportation, scenic and sightseeing transportation, passenger car rental, travel arrangement and reservation services, arts/entertainment/recreation, and accommodation and food services. The data presented are only for coastal counties and parishes because these are where the recreation and tourism industry might potentially be affected by routine events, such as OCS-related trash and debris, visual effects of structures, air and vessel traffic, and accidental events, such as oil spills. (This data differs from the data used to describe Labor Market Areas (LMA's) and Economic Impact Areas (EIA's) in Tables 3-15 and 3-16 in the Multisale EIS, which includes all counties and parishes. The LMA's and EIA's extend inland geographically into areas where tourism and recreation is not linked to coastal environments. The data in **Table 4-9** more correctly describes the level of tourism-related employment and establishments potentially affected by OCS activities.)

Marine recreation is defined as coastal and ocean participation in at least 1 of 19 activities/settings. In 2000, over 34 million people participated in some form of marine recreation in the five Gulf Coast States. Beaches are a major recreational resource that attracts tourists and residents to the Gulf Coast for fishing, swimming, shelling, beachcombing, camping, picnicking, bird watching, and other activities. The five Gulf Coast States have 1,734 mi (2,791 km) of beach and 706 beaches (USEPA, 2004b), and visiting beaches was the number one activity/setting for marine recreation. Nearly 22 million people participated in beach activities in 2000. Updates of these data from the 1999-2000 National Survey on Recreation and the Environment are currently underway. The scenic and aesthetic value of Gulf Coast beaches plays an important role in attracting visitors to the coastal zone (USDOC, NOAA, 2005b).

The value of recreation and tourism in the Gulf of Mexico coastal zone from Texas through Florida has been estimated in the tens of billions of dollars annually (USDOI, MMS, 2001a; pages III-101 and III-102). Tourists visiting Florida's beaches in 2000 spent approximately $21.9 billion, resulting in an indirect economic effect of $19.7 billion and a total economic impact of $41.6 billion (Florida Sea Grant, 2005). In 2003, Baldwin County had a travel-related economic impact on Alabama totaling more than $1.8 billion (Economic Development Partnership of Alabama, 2005). From Alabama through Texas, substantial recreational activity takes place in sight of Gulf of Mexico oil and gas structures such as pipeline landfalls and offshore platforms. Offshore platforms also function as artificial reefs and, as such, have considerable positive economic impact by attracting fish and fishermen alike (Hiett and Milon, 2002).

In 2001, 2.5 million residents and nonresidents 16 years old and older hunted in the Gulf Coast States and spent approximately $3.4 billion on hunting. Nine million U.S. residents 16 years old or older fed, observed, or photographed wildlife in the Gulf Coast States in 2001 and spent roughly $3.9 billion (USDOI, FWS and USDOC, Bureau of the Census, 2001). These figures are for the whole of each Gulf Coast State, and the coastal hunting and wildlife observation activities presumably would constitute a small fraction of the total.

The previous discussions describe the tourism and recreation baseline for the Gulf of Mexico prior to the impacts of Hurricanes Katrina and Rita in 2005. Both of these hurricanes caused extensive adverse impact to tourism and recreation throughout the Gulf by disrupting recreational services and destroying beaches, public piers, hotels, marinas, recreational pleasure craft and charter boats, and numerous forms of other recreational infrastructure. The extent of the 2005 hurricane impacts to tourism and recreation has yet to be fully quantified, but it will likely take years for tourism and recreation to return to pre-hurricane levels in some areas. One source does provide information related to the effects of the hurricanes on coastal areas. Hurricanes Katrina and Rita deposited extensive amounts of debris over various areas of the Gulf Coast. Because submerged marine debris poses a hazard to vessel traffic, NOAA is conducting underwater surveys off the coasts of Louisiana, Mississippi, and Alabama. This information is being used by State and Federal agencies tasked with removing marine debris left by Hurricane Katrina and will aid in planning for the aftermath of future storms (USDOC, NOAA, 2007).

The Ocean Conservancy sponsors national and international beach cleanups, including annual events in Louisiana, Mississippi, and Alabama. The Louisiana event is coordinated by the LADEQ Litter

Reduction and Public Action Program. Statistics have not been published for the last Louisiana event, held in September 2007 (LADEQ, 2007c). The Mississippi Marine Debris Task Force sponsors the annual Mississippi Coastal Cleanup. During the 19th Annual Mississippi Coastal Cleanup on September 15, 2007, volunteers collected over 53,800 pounds of trash along 159 mi (256 km) of Mississippi Gulf Coast and barrier islands (Mississippi Alabama Sea Grant Consortium, 2007). The Alabama Coastal Cleanup is coordinated through the Alabama Dept. of Conservation and Natural Resources, State Lands Division, Coastal Section and the Alabama People Against a Littered State. Since joining the effort in 1987, 48,446 participants in Alabama have removed a total of 902,242 lb of debris and have cleaned 2,847 mi (4,582 km) of coastline (Alabama Coastal Cleanup, 2007).

4.1.14.2. Impacts of Routine Events

Background/Introduction

The primary impact-producing factors associated with offshore oil and gas exploration and development, and most widely recognized as threats to the enjoyment and use of recreational beaches, are oil spills and offshore trash, debris, and tar. Additional factors such as the physical presence of platforms and drilling rigs can affect the aesthetics of beach appreciation and are other areas of concern. Oil spills and tar result from accidental events and are analyzed below in **Chapter 4.1.14.3**. This section discusses the possible effects of routine activities associated with a CPA proposed action, the addition of the 181 South Area, and the WPA on recreational resources.

A detailed description of routine impacts on recreational resources associated with a CPA or WPA proposed action can be found in Chapters 4.2.2.1.13 and 4.2.1.1.11 of the Multisale EIS, respectively. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS and the addition of the 181 South Area to the proposed CPA sale area.

Trash and debris is the primary impact-producing factor from routine OCS activities that could affect the use and enjoyment of recreational beaches. Litter on recreational beaches from OCS operations could adversely affect the ambience of the beach environment, detract from the enjoyment of beach activities, and increase administrative costs to maintain beaches. Trash items such as glass, pieces of steel, and drums with chemical residues could also constitute a health threat to recreational beach users. The physical presence of platforms and drilling rigs visible from shore and the noise associated with vessels and aircraft traveling between coastal shore bases and offshore operation sites are also impact-producing factors that could adversely affect the natural ambience of recreational beaches, particularly on primitive coastal beaches. Depending on weather conditions, drilling rigs and platforms placed 3-10 mi (5-16 km) from land are within sight range of shoreline. Currently, nearshore oil and gas operations are present in State and Federal waters off Louisiana, Mississippi, and Alabama.

CPA Proposed Action Analysis

A CPA proposed action is projected to result in the drilling of 77-88 exploration and production wells and the installation of 20-21 platforms in water depths <60 m (200 ft). In water depths of 60-200 m (200-656 ft), a proposed action is projected to result in 31-38 wells and 2-3 platforms. The addition of the 181 South Area to the proposed CPA sale area is projected to result in an additional 9-12 wells and the installation of up to 1 platform. Marine debris would be lost from time to time from OCS operations associated with drilling activities and production facilities projected to result from a proposed action in the CPA. Current industry waste management practices, training and awareness programs focused on the beach litter problem, and the OCS industry's continuing efforts to minimize, track, and control offshore wastes are expected to minimize potential for accidental loss of solid wastes from OCS oil and gas operations. Recreational beaches in Louisiana and Texas are most likely to be impacted by any waterborne trash. Beached litter and debris from a proposed action is unlikely to be perceptible to beach users or administrators because a proposed action would constitute only a small percentage of the total OCS Program activity in the CPA.

A CPA proposed action is expected to result in 119,000-241,000 service-vessel trips over the life of the leases, or about 2,975-6,025 trips annually. A proposed action is also expected to result in 1,004,000-2,241,000 helicopter operations (take off and landing), which is about 25,100-56,025 operations annually.

Due to the amount of additional production projected from the addition of the 181 South Area, operations in this area are not expected to generate additional traffic and noise sufficient to change the analysis presented in the Multisale EIS. Service vessels are assumed to use established nearshore traffic lanes, and helicopters are assumed to comply with areal clearance restrictions at least 90 percent of the time. These actions tend to distance traffic from recreational beach users and, thereby minimize its effects. This additional helicopter and vessel traffic would add very little noise pollution likely to affect beach users.

Because the 181 South Area is on the eastern edge of the CPA sale area nearly 130 mi (209 km) from the nearest coast and because it is expected to result in very limited additional activity, the 181 South Area would add little to the impacting factors relevant to recreational resources (e.g., traffic and oil spills). Therefore, its inclusion does not change the analysis or conclusions regarding recreation that are found in Chapters 4.2.1.1.11 and 4.2.2.1.13 of the Multisale EIS.

WPA Proposed Action Analysis

A WPA proposed action is projected to result in the drilling of 87-125 exploration and production wells and the installation of 21-31 platforms in water depths <60 m (200 ft). In water depths of 60-200 m (200-656 ft), a proposed action is projected to result in 18-22 wells and 2 platforms. Marine debris would be lost from time to time from OCS operations associated with drilling activities and production facilities projected to result from a WPA proposed action. Current industry waste management practices, training and awareness programs focused on the beach litter problem, and the OCS industry's continuing efforts to minimize, track, and control offshore wastes are expected to minimize potential for accidental loss of solid wastes from OCS oil and gas operations. Recreational beaches in Louisiana and Texas are most likely to be impacted by any waterborne trash. Beached litter and debris from a proposed action is unlikely to be perceptible to beach users or administrators because a proposed action would constitute only a small percentage of the total OCS Program activity in the WPA.

A WPA proposed action is expected to result in 94,000-155,000 service-vessel trips over the life of the leases or about 2,350-3,875 trips annually. A proposed action is also expected to result in 400,000-900,000 helicopter operations (take off and landing), which is about 10,000-22,500 operations annually. Service vessels are assumed to use established nearshore traffic lanes, and helicopters are assumed to comply with areal clearance restrictions at least 90 percent of the time. These actions tend to distance traffic from recreational beach users and, thereby minimize its effects. This additional helicopter and vessel traffic would add very little noise pollution likely to affect beach users.

Summary and Conclusion

The proposed actions in the CPA, including the 181 South Area, and WPA would result in marine debris lost from time to time from operations. However, the impact on Gulf Coast recreational beaches and beach use is expected to be minimal. The incremental increase from the CPA, the 181 South Area addition, and WPA in helicopter and vessel traffic is projected to add very little additional noise that may affect beach users. The proposed actions are projected to result in nearshore operations that may adversely affect the enjoyment of some Gulf Coast beach uses; however, these would have little effect on the number of beach users. While these factors, either individually or collectively, may adversely affect the quality of some recreational experiences, they are unlikely to reduce the number of recreational visits to Gulf Coast beaches.

4.1.14.3. Impacts of Accidental Events

Background/Introduction

A detailed description of accidental impacts on recreational resources can be found in Chapter 4.4.12 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS and the addition of the 181 South Area to the proposed CPA sale area.

While respondents in the MMS study, *Socioeconomic and Environmental Issues Analysis of Oil and Gas Activity on the Outer Continental Shelf of the Western Gulf of Mexico*, recognized the threats to recreation and tourism posed by such factors as offshore trash and debris, the visual impacts of offshore structures, and the noise of vessel and helicopter traffic, most believed that a large oil spill would have devastating effects on the tourist industry. While "small" spills were deemed to occur with some frequency, it is "the big one" that people fear most (Kelley, 2002). Offshore trash and tar is often noted as the second biggest threat to the condition of Gulf Coast beaches. Large oil spills contacting recreational beaches can cause short-term displacement of recreational activity from the areas directly affected, including the closure of beaches for periods of 2-6 weeks or until the cleanup operations are complete. A large oil spill can acutely threaten recreational beaches for up to 30 days.

Factors such as season, weather and tidal action, beach type and location, amount, condition and type of oil washing ashore, cleanup methods, and publicity can influence the severity of effects on a recreational beach and its use. Sorensen (1990) reviews the economic effects of several historic large oil spills on beaches and concludes that such spills near a coastal recreational area would reduce visitation by 5-15 percent over one season but would have no long-term effect on tourism.

Tarballs (the floating residue remaining after oil slicks dissipate) are likely results from large spills. Tarballs are known to persist as long as 1-2 years in the marine environment. A MMS-funded study investigated the abundance and sources of tarballs on the recreational beaches of the CPA (Henry et al., 1993). The study concludes that the presence of tarballs along the Louisiana coastline is primarily related to marine transportation activities and that their effect on recreational use is below the level of social and economic concern.

CPA Proposed Action Analysis

The risk of a spill occurring from a CPA proposed action and contacting recreational beaches is described in Chapter 4.3.1.8 of the Multisale EIS. **Figure 3-8** displays the probabilities of oil spills ≥1,000 bbl occurring and contacting within 10 days shoreline as a result of a CPA proposed action. In a CPA proposed action, the probabilities are >0.5 percent in the following parishes and counties: Cameron, Vermilion, Iberia, Terrebonne, Lafourche, Jefferson, St. Bernard, and Plaquemines Parishes in Louisiana; and Jefferson and Galveston Counties in Texas. **Figure 3-8** provides the probabilities of oil spills ≥1,000 bbl occurring and contacting within 10 days State offshore waters or recreational beaches as a result of a CPA or WPA proposed action and reaching major recreational beach areas. As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. Activity that would result from the addition of the 181 South Area would cause a negligible increase in the risk of a large spill occurring and contacting coastal counties and parishes, and major recreational beach areas.

Should a spill occur, such factors as season, weather and tidal action, beach type and location, amount, condition and type of oil washing ashore, and cleanup methods would have a bearing on the severity of effects the spill would have on a recreational beach and its use. A spill near a coastal recreational area would reduce visitation in the area by 5-15 percent over one season but would have no long-term effect on tourism (Sorensen, 1990).

Large oil and petroleum product spills could occur over the next 40 years and cause the temporary closure (up to 6 weeks) of park and recreation areas along the Gulf Coast and could affect tourism at the local level. The most likely source of OCS-related offshore oil spills is pipelines, and, because the existing pipeline system is concentrated off the coasts of western Louisiana and eastern Texas, these coasts are also the most likely location for a spill to occur and contact a recreational resource. Spills from OCS operations or import tankers occurring in proximity to recreational beaches and coastal parks could result in shoreline oiling, leading to the closure of these parks and beaches during cleanup operations, which can last from 2 to 6 weeks.

WPA Proposed Action Analysis

The risk of a spill occurring from a WPA proposed action and contacting recreational beaches is described under Chapter 4.3.1.8 of the Multisale EIS. **Figure 3-8** displays the probabilities of oil spills ≥1,000 bbl occurring and contacting within 10 days shoreline as a result of a WPA proposed action. In a WPA proposed action, the probabilities are >0.5 percent in the following parishes and counties: Cameron Parish in Louisiana; and Aransas, Calhoun Matagorda, Brazoria, Galveston, and Jefferson Counties in

Texas. **Figure 3-8** provides the probabilities of oil spills ≥1,000 bbl occurring and contacting within 10 days State offshore waters or recreational beaches as a result of a CPA or WPA proposed action and reaching major recreational beach areas. Should a spill occur, such factors as season, weather and tidal action, beach type and location, amount, condition and type of oil washing ashore, and cleanup methods would have a bearing on the severity of effects the spill would have on a recreational beach and its use. A spill near a coastal recreational area would reduce visitation in the area by 5-15 percent over one season but would have no long-term effect on tourism (Sorensen, 1990).

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Summary and Conclusion

It is unlikely that a spill would be a major threat to recreational beaches because any impacts would be short term and localized. Should a spill contact a recreational beach, short-term displacement of recreational activity from the areas directly affected would occur. Beaches directly impacted would be expected to close for periods of 2-6 weeks or until the cleanup operations were complete. Should a spill result in a large volume of oil contacting a beach or a large recreational area being contacted by an oil slick, visitation to the area could be reduced by as much as 5-15 percent for as long as one season, but such an event should have no long-term effect on tourism. Tarballs can lessen the enjoyment of the recreational beaches but they should have no long-term effect on the overall use of the beaches. Activity that would result from the addition of the 181 South Area would cause a negligible increase in the risk of a large offshore oil spill occurring and contacting coastal counties and parishes.

4.1.14.4. Cumulative Impacts

Background/Introduction

This cumulative analysis of possible effects to recreational resources considers the effects of impact-producing factors related to the CPA and WPA proposed actions (Chapters 4.2.1.1.11 and 4.2.2.1.13 of the Multisale EIS) including the addition of the 181 South Area to the CPA, plus those impact-producing factors related to prior and future OCS sales, State offshore and coastal oil and gas activities throughout the Gulf of Mexico, tankering of crude oil imports, merchant shipping, commercial and recreational fishing, military operations, recreational use of beaches, and other offshore and coastal activities that result in debris, litter, trash, and spills, which may adversely affect major recreational beaches. Specific OCS-related, impact-producing factors analyzed include trash and debris, the physical presence of platforms and drilling rigs, support vessel and helicopter operations, oil spills, and spill cleanup activities. It does not consider factors that cannot be predicted over the 40-year analysis period such as land development, civil works projects, natural phenomena such as hurricanes, or fluctuations in the health of the U.S. economy and the price of gasoline. All of these local- and national-level factors have affected, and would continue to have greater effects on, the travel and tourism industry in general and on beach use along the U.S. Gulf Coast than do the factors that can be considered in the OCS Program.

Trash and debris are a recognized problem affecting the enjoyment and maintenance of Gulf Coast recreational beaches. Extensive aerial surveys conducted by NMFS over large areas of the Gulf of Mexico characterized floating offshore trash and debris as an ubiquitous, Gulfwide problem (Lecke-Mitchell and Mullin, 1997). Coastal and offshore oil and gas operations contribute to trash and debris washing up on Texas and Louisiana beaches (Miller and Echols, 1996; Lindstedt and Holmes, 1988). Regulatory, administrative, educational, and volunteer programs involving government, industry, environmental, school, and civic groups; specific marine user groups; and private citizens are committed to monitoring and reducing the beach litter problem Gulfwide.

CPA and WPA Proposed Actions Analysis

Trash and debris detract from the aesthetic quality of beaches, can be hazardous to beach users, and can increase the cost of maintenance programs. The continued and expanded oil and gas operations throughout the Gulf of Mexico have contributed to the trash and debris on coastal beaches. The OCS activities are one of the many offshore activities (such as merchant shipping, Naval operations, offshore and coastal commercial and recreational fishing, and State offshore oil and gas activities), coastal activities (such as recreation, State onshore oil and gas activities, and condominiums and hotels), and natural phenomena (such as storms, hurricanes, and river outflows) that contribute to the debris and pollution found on Gulf of Mexico recreational beaches.

The OCS oil and gas industry is mitigating its contribution to this problem through (1) improved offshore waste management practices, (2) a strong commitment to participation in the annual removal of trash and litter from recreational beaches affected by their offshore operations, and (3) its support of MARPOL Annex V. The special efforts to generate cooperation and support from all Gulf user groups through the Gulf of Mexico program should lead to a decline in the overall level of human-generated trash adversely affecting recreational beaches throughout the Gulf. The MMS also mitigates this problem with rules governing the handling and disposal of trash generated on OCS structures. Because of the relative size of the OCS contribution to the trash and debris problem and because of ongoing industry and governmental efforts to mitigate this problem, the analysis in Chapters 4.2.1.1.11 and 4.2.2.1.13 of the Multisale EIS concluded that the incremental contribution of the CPA and WPA proposed actions to trash and debris would be minor. Due to the limited amount of additional production projected from the addition of the 181 South Area, this addition would not change this cumulative assessment.

At present, there are approximately 4,000 OCS platforms on the Gulf of Mexico OCS. The CPA is located 3 nmi from the Louisiana, Mississippi, and Alabama shores. In the CPA, there are nearly 1,000 platforms (34% of the structures, in water depths <60 m (200 ft)) within 10 mi (16 km) of the shore. Of those, most (84%) are located in the CPA west of the Mississippi River. In the CPA east of the Mississippi River, 14 percent of OCS platforms are within 10 mi (16 km) of the Louisiana, Mississippi, or Alabama coast. The WPA is 10 mi (16 km) from the Texas shore; therefore, no structures located in the WPA would be visible from shore. Based on these numbers and peak-year projections, a maximum of about 1,000 OCS production structures would be visible from shore at one time, and this number would drastically decrease during the 40-year analysis period as operations move into deeper water. Oil and gas operations in State waters off Texas, Louisiana, and Alabama are also visible from shore. Aesthetic impacts of the visible presence of offshore drilling rigs and platforms are unlikely to affect the level of beach recreation, but they may affect the experience of some beach users, especially at beach areas such as the Padre Islands National Seashore in Texas and the Gulf Islands National Seashore on Mississippi's outer barrier islands. Because of its location to shore (nearly 130 mi or 209 km), the addition of the 181 South Area would make no contribution to the aesthetic impacts of a CPA proposed action.

Vessels and helicopter traffic servicing OCS operations would be seen and heard by beach users from time to time. Existing and future oil and gas developments in the State waters contribute to these impacts. Commercial and recreational maritime traffic add to the visual and noise impacts. See Chapter 4.1.1.2.2 of the Multisale EIS for a summary of the report on potential OCS impacts on recreational beach activity (Kelley, 2002). Because of the limited amount of additional production projected from the addition of the 181 South Area and because of its location, this addition does not change the analysis of the cumulative effects analysis of OCS-related traffic on beach users in the Multisale EIS.

Chapter 4.3.1 of the Multisale EIS discusses the risk of spill occurrence, the number of spills estimated for the OCS Program, and the likelihood of an OCS spill contacting the Gulf Coast. The scenarios analyzed hypothetical oil spills of ≥1,000 bbl occurring from future OCS oil and gas operations in the Gulf of Mexico. Should such a spill contact a recreational beach, it would result in a short-term displacement of recreational activity from the areas directly affected. Beaches directly impacted would be expected to close for periods of 2-6 weeks or until the cleanup operations were complete. Should a spill occur, factors such as season, extent of pollution, beach type and location, condition and type of oil washing ashore, tidal action, and cleanup methods would have a bearing on the severity of effects the spill would have on a recreational beach and its use. Sorenson (1990) reviewed the economic effects of several historic, large oil spills on beaches and concluded that a spill near a coastal recreation area would reduce visitation in the area by 5-15 percent over one season but would have no long-term effect on tourism.

The estimated annual oil-spill occurrences expected in the future in the CPA or WPA, based on historical data maintained by MMS and USCG, are presented in Table 4-13 of the Multisale EIS. The great majority of coastal spills that do occur from OCS-related activities are likely to originate near terminal locations in the coastal zone around marinas, refineries, commercial ports, pipeline routes, and marine terminal areas, usually during the transfer of fuel. The average fuel-oil spill is 18 bbl. It is expected that these frequent, but small, spills would not affect coastal beach use. Due to the limited amount of additional production projected from the addition of the 181 South Area and its location far from shore, this addition does not change the analysis of the cumulative effects of large and small oil spills in the Multisale EIS.

Although hundreds of small spills are documented annually from all sources within the marine and coastal environment of the Gulf Coast, it is primarily large spills (≥1,000 bbl) that are a major threat to coastal beaches. Should a large spill impact major recreational beaches, no matter the source, it would result in unit and park closures until cleanup is complete. Oil-pollution events impacting recreational beaches would generate immediate cleanup response from responsible oil and gas industry sources. Recreational use would be displaced from impacted beaches and closed parks (generally 2-6 weeks). Recreational use and tourism impacts would be more significant if spills affect beaches during peak-use seasons and if publicity is intensive and far-reaching.

Summary and Conclusion

Debris and litter derived from both offshore and onshore sources are likely to diminish the tourist potential of beaches and to degrade the ambience of shoreline recreational activities, thereby affecting the enjoyment of recreational beaches throughout the area. The incremental beach trash resulting from the CPA and WPA proposed actions is expected to be minimal.

Platforms and drilling rigs operating nearshore may affect the ambience of recreational beaches, especially beach wilderness areas. The sound, sight, and wakes of OCS-related and non-OCS-related vessels, as well as OCS helicopter and other light aircraft traffic, are occasional distractions that are noticed by some beach users.

Oil that contacts the coast may preclude short-term recreational use of one or more Gulf Coast beaches. The displacement of recreational use from impacted areas would occur, and a short-term decline in tourism may result. Beach use at the regional level is unlikely to change from normal patterns; however, the closure of specific beaches or parks directly impacted by a large oil spill is likely during cleanup operations. The incremental contribution of a CPA or WPA proposed action to the cumulative impact on recreational resources is minor due to the limited effect of increased helicopter, vessel traffic, and marine debris on the number of beach users. Because only a limited amount of additional production is projected from the addition of the 181 South Area and because its location is nearly 130 mi (209 km) offshore, this addition would not change the analysis of cumulative impacts to recreation and tourism presented in the Multisale EIS.

4.1.15. Archaeological Resources

Archaeological resources are any material remains of human life or activities that are at least 50 years of age and that are of archaeological interest (30 CFR 250.105). The archaeological resources regulation (30 CFR 250.194) provides specific authority to each MMS Regional Director to require archaeological resource surveys, analyses, and reports. Surveys are required prior to any exploration or development activities on leases within areas determined to have a high potential for archaeological resources (NTL 2005-G07 and NTL 2006-G07).

The MMS has reexamined the analysis for prehistoric and historic archaeological resources presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for archaeological resources presented in the Multisale EIS. Given the extreme water depths in the 181 South Area (nearly 130 mi or 209 km), no prehistoric archaeological resources would likely be encountered in this area. Areas considered by MMS to have a high potential for historic shipwrecks are located throughout the Gulf of Mexico, including the 181 South Area.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. The greatest potential impact to an archaeological resource as a result of routine activities associated with a CPA or 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 or historic site. The archaeological survey and archaeological clearance of sites 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 damage to or loss of significant and/or unique archaeological information. It is expected that coastal archaeological resources will 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 a 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 would be temporary and reversible.

The effects of the various impact-producing factors of cumulative activities have likely resulted in the loss of significant or unique historic archaeological information. The incremental contribution of a CPA or WPA proposed action to the cumulative impacts on offshore historic archeological resources is expected to be very small due to the efficacy of the required remote-sensing survey and archaeological report. The incremental contribution of a proposed action to the cumulative impacts on coastal archeological resources is also expected to be very small due to the review and approval processes of the various Federal, State, and local agencies involved in permitting onshore activities.

4.1.15.1. Description of the Affected Environment

The description of archaeological resources (prehistoric and historic) can be found in Chapter 3.3.4 of the Multisale EIS. A summary of these resources is included below.

Prehistoric Archaeological Resources

Available geologic evidence indicates that sea level in the northern Gulf of Mexico was at least 90 m (295 ft), and possibly as much as 130 m (427 ft), lower than present sea level, and that the low sea-stand occurred during the period 20,000-17,000 years before present (B.P.) (Nelson and Bray, 1970). Sea level in the northern Gulf reached its present stand around 3,500 years B.P. (CEI, 1986).

During periods that the continental shelf was above sea level and exposed, the area was open to habitation by prehistoric peoples. The advent of early man into the Gulf of Mexico region is currently accepted to be around 12,000 years B.P. (Aten, 1983). According to the sea-level curve for the northern Gulf of Mexico proposed by Coastal Environments, Inc. (CEI), sea level at 12,000 years B.P. would have been approximately 45 m (148 ft) below the present level (CEI, 1977 and 1982). On this basis, the continental shelf shoreward of the 45- to 60-m (148- to 197-ft) bathymetric contours has a potential for prehistoric sites dating after 12,000 years B.P. Because of inherent uncertainties in both the extent of emergent continental shelf depth and the entry date of prehistoric man into North America, MMS adopted the 12,000 years B.P. and the 60-m (197-ft) water depth as the seaward extent of the prehistoric archaeological high-potential area. Areas with a potential for containing prehistoric archaeological resources are located within the CPA and WPA lease areas; however, given the extreme water depths in the 181 South Area (nearly 130 mi or 209 km), no prehistoric archaeological resources could be encountered in this area.

Historic Archaeological Resources

There are areas of the northern Gulf of Mexico that are considered by MMS to have a high potential for historic period shipwrecks (Garrison et al., 1989; Pearson et al., 2003). These areas are located throughout the Gulf of Mexico, including the 181 South Area. Statistical analysis of the shipwreck location data identified two specific types of high-potential areas: (1) within 10 km (6 mi) of the shoreline and (2) proximal to historic ports, barrier islands, and other loss traps. Additionally, MMS has created high-potential search polygons associated with individual shipwrecks to afford protection to wrecks located outside the two high-potential areas. Recent research on historic shipping routes, however, suggests that the ultra-deepwater area of the Gulf of Mexico, between 25º and 27.5º N. latitude, was located along the historic Spanish trade route, which therefore increases the probability that an historic shipwreck could be located in this area (Lugo-Fernandez et al., 2007). This route runs through the proposed sale areas including the 181 South Area, and much of this area is not currently identified as requiring an archaeological assessment. A study to conduct archival research on these historic shipping routes has been included on the Fiscal Year 2008 Studies Development Plan.

The MMS shipwreck database lists numerous shipwrecks that fall within the proposed sale areas, including the 181 South Area. Many of these reported shipwrecks may be considered historic and could be eligible for nomination to the National Register of Historic Places. Most of these wrecks are known only through the historical record and, to date, have not been located on the ocean floor. The MMS Shipwreck Database currently lists 954 wrecks in the CPA (including the 181 South Area) and 516 wrecks in the WPA. These wrecks are listed by planning area in **Table 4-10**. This list should not be considered exhaustive.

The specific locations of archaeological sites cannot be known without first conducting a high-resolution, remote-sensing survey of the seabed and near-surface sediments. Regular reporting of shipwrecks did not occur until late in the 19th century, and losses of several classes of vessel, such as small fishing boats, were largely unreported in official records. Aside from acts of war, hurricanes cause the greatest number of wrecks in the Gulf. Wrecks occurring in deeper water on the Federal OCS would have a moderate to high preservation potential because they lie beyond the influence of storm currents and waves. However, factors affecting the preservation of wood and iron at great depth in the Gulf of Mexico are, as of yet, poorly understood. Shipwrecks occurring in shallow water nearer to shore are more likely to have been reworked and disturbed by storms. Historic research indicates that shipwrecks occur less frequently in Federal waters, where they are likely to be better preserved, less disturbed, and, therefore, more likely to be eligible for nomination to the National Register of Historic Places than are wrecks in shallower State waters.

The MMS approved the latest revision of NTL 2005-G07, "Archaeological Resource Surveys and Reports," on July 1, 2005. This revised NTL (1) continues to require a 50-m (164-ft) line-spacing for historic shipwreck remote-sensing surveys in water depths <200 m (656 ft) and a 300-m (984-ft) line-spacing for historic shipwreck remote-sensing surveys in water depths >200 m (656 ft), (2) increases the number of historic shipwreck blocks along the deepwater approach to the Mississippi River, (3) issues a reminder to operators of their requirement to notify MMS within 48 hr of the discovery of any potential archaeological site, and (4) updates some of the reporting requirements for archaeological assessments.

Recent hurricane activity in the Gulf of Mexico is certain to have impacted archaeological resources in shallow water. A search was conducted for new information published since completion of the Multisale EIS; however, little new information was identified. Yet, it is almost certain that any shipwrecks within the path of Hurricanes Katrina or Rita in shallow water were impacted to some extent by these storms. In September 2005, the National Park Service (NPS) conducted a study of sites along the Gulf Coast that were impacted by Hurricane Katrina (USDOI, NPS, 2005). This assessment identified three types of damage that can occur to archaeological sites: tree throws; storm surge, scouring and erosion; and seabed shifting. On the OCS, the two primary types of damage would be associated with storm surge and seabed shifting. Damage from either of these activities could adversely affect both prehistoric and historic sites on the OCS. In early 2007, the MMS awarded a study to investigate the impacts that recent storm activity may have had on historic shipwrecks in the Gulf of Mexico. Remote-sensing surveys for this study were completed in May 2007 and dive operations were completed in October 2007. A final report of findings is expected early in 2009. Preliminary analysis of the remote-sensing surveys and diver investigations indicates that at least 3 of the 10 shipwrecks examined were affected by recent storm activity (PBS&J, in preparation).

A recently published report, *Archaeological and Biological Analysis of World War II Shipwrecks in the Gulf of Mexico: Artificial Reef Effect in Deep Water* (Church et al., 2007), documents the results of a multidisciplinary study that focused on the biological and archaeological aspects of seven World War II era shipwrecks in the north-central portion of the Gulf of Mexico. The study was funded by MMS and NOAA's Office of Ocean Exploration.

Seven shipwrecks, including a German submarine (U-boat) and some of its targets, were investigated. The ships lie in water ranging from 122 to 1,981 m (400 to 6,500 ft) deep. The study found deep-sea wrecks act as artificial reefs, attracting far more species of plants and animals than expected. The finding indicates that oil and gas production platforms in deep water are likely to serve as hard surface, supporting hundreds of life forms.

The marine archaeology part of the study positively confirmed the identity of three wrecks and found a relationship among water depth, ship size, and the size of the debris field. The condition, state of preservation, and deterioration rate for each shipwreck, as well as potential environmental impact, was assessed. In general there was a correlation between the wreck's state of preservation and depth in this area of the Gulf of Mexico. Sediment core samples taken at various locations at each wreck site indicated the wreck sites are not contaminating or adversely impacting the surrounding seafloor at this time.

4.1.15.2. Impacts of Routine Events

A detailed description of the possible effects of routine activities associated with a CPA or WPA proposed action on archaeological resources can be found in Chapters 4.2.2.1.14 and 4.2.1.1.12 of the Multisale EIS, respectively.

Blocks having a high potential for the occurrence of prehistoric, prehistoric and historic, or historic archaeological resources are found in the CPA and WPA. An Archaeological Resources Stipulation was included in all Gulf of Mexico lease sales from 1973 through 1994. The stipulation has been incorporated into operational regulations, which can be found at 30 CFR 250.194, 250.203(b)(15), 250.203(o), 250.204(b)(8)(v)(A), 250.204(s), and 250.1007(a)(5). All protective measures offered in the stipulation have been adopted in this regulation.

The likely locations of archaeological sites cannot be delineated without first conducting a remote-sensing survey of the seabed and near-surface sediments. The MMS regulations that require OCS lessees and operators and applicants for pipeline rights-of-way to conduct an archaeological survey prior to proposed activities within areas determined to have a high potential for historic and/or prehistoric archaeological resources are described in Chapter 1.5 of the Multisale EIS.

Prehistoric Archaeological Resources

Blocks with a high potential for prehistoric archaeological resources are found landward of the 12,000 years B.P. shoreline position, which is roughly approximated by the last geologic still-stand before inundation at approximately 13,000 years B.P. This 13,000-years-B.P. still-stand also roughly follows the 45-m (148-ft) bathymetric contour. Because of inherent uncertainties in both the depth of historic sea-level stands and the entry date of prehistoric man into North America, MMS has adopted the 60-m (197-ft) water depth as the seaward extent of the area considered to have potential for prehistoric archaeological resources.

Offshore development as a result of a CPA or 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.

The placement of drilling rigs and production systems has the potential to cause physical impact to prehistoric archaeological resources. The area of seafloor disturbance from each of these structures is defined in Chapter 4.1.1.3.2.1 of the Multisale EIS. Pile driving associated with platform emplacement may also cause sediment liquefaction an unknown distance from the piling, disrupting stratigraphy in the area of liquefaction.

Pipeline placement has the potential to cause a physical impact to prehistoric archaeological resources. Pipelines placed in water depths of <60 m (200 ft) must be buried. Burial depths of 1 m (3.28 ft) are required, with the exception of shipping fairways and anchorage areas, where the requirements are 3.0 m (9.84 ft) and 4.6 m (15 ft), respectively. Anchoring associated with platform and pipeline emplacement, as well as with service-vessel and shuttle-tanker activities, may also physically impact prehistoric archaeological resources. It is assumed that, during pipeline emplacement, an array of eight 20,000-lb anchors is continually repositioned around the pipelaying barge.

Onshore prehistoric archaeological resources include sites, structures, and objects such as shell middens, earth middens, campsites, kill sites, tool manufacturing areas, ceremonial complexes, and earthworks. Prehistoric sites that have yet to be identified would have to be assessed after discovery to determine the uniqueness or significance of the information that they contain. Sites already listed in the National Register of Historic Places and those considered eligible for the Register have already been evaluated as having the potential for making a unique or significant contribution to science. Of the unidentified coastal prehistoric sites that could be impacted by onshore development, some may contain unique information.

Onshore development as a result of a proposed action could result in direct physical contact between construction of new onshore facilities or a pipeline landfall and a previously unidentified prehistoric site. Direct physical contact with a prehistoric site could destroy fragile artifacts or site features and could disturb the site context. The result would be the loss of information on the prehistory of North America and the Gulf Coast region.

Since all platform locations within the high-potential areas for the occurrence of offshore prehistoric archaeological resources are given archaeological clearance prior to setting the structure, removal of the structure should not result in any adverse impact to archaeological resources. This is consistent with the findings of the *Programmatic Environmental Assessment: Structure Removal Activities, Central and Western GOM Planning Areas* (USDOI, MMS, 1987).

Except for the projected 0-1 new gas processing plant and 0-1 new pipeline landfall, a proposed action would require no new oil and gas coastal infrastructure. Any facility constructed must receive approval from the pertinent Federal, State, county/parish, and/or community involved. Protection of archaeological resources in these cases is expected to be achieved through the various approval processes involved. There should, therefore, be no impact to onshore prehistoric sites from onshore development related to a proposed action.

In order to reduce the risk of impacting a prehistoric archaeological resource during an MMS-permitted activity, the MMS requires a 300-m (984-ft), remote-sensing survey linespacing for lease blocks that have been identified as having a high potential for containing prehistoric resources. The current NTL—NTL 2005-G07, effective July 1, 2005—supersedes all other archaeological NTL's and Letters to Lessee (LTL's), and updates requirements to reflect current technology. The list of lease blocks requiring an archaeological survey and assessment are identified in NTL 2006-G07.

Historic Archaeological Resources

The areas of the northern Gulf of Mexico that are considered to have high potential for historic period shipwrecks were redefined as a result of an MMS-funded study (Pearson et al., 2003; NTL 2006-G07). The 2003 study refined the shipwreck database in the Gulf of Mexico, initially developed by a previous MMS-funded study (Garrison et al., 1989), and identified new areas along the approach to the Mississippi River that have a high potential for containing historic shipwrecks. The Garrison et al. (1989) study used statistical analysis of shipwreck location data to identify two specific types of high-potential areas—the first within 10 km (6 mi) of the shoreline and the second proximal to historic ports, barrier islands, and other loss traps. High-potential search polygons associated with individual shipwrecks were also created to afford protection to wrecks located outside the two aforementioned high-potential areas. The Pearson et al. (2003) study incorporated this model into their recommendations, and the historic archaeological high-potential areas are under MMS review at the time of this writing. Additionally, recent research on historic shipping routes in the Gulf of Mexico suggests that the colonial trade route from Veracruz, Mexico, to Havana, Cuba, ran along the deepwater portion of the CPA and WPA between 25° and 27.5° N. latitude, which therefore increases the probability that an historic shipwreck could be located in this area (Lugo-Fernandez et al., 2007).

Offshore development could result in a drilling rig, platform, pipeline, dredging activity, or anchors having an impact on an historic shipwreck. Direct physical contact with a wreck site could destroy fragile ship remains, such as the hull and wooden or ceramic artifacts, and could disturb the site context. The result would be the loss of archaeological data on ship construction, cargo, and the social organization of the vessel's crew, and the concomitant loss of information on maritime culture for the period from which the ship dates.

The placement of drilling rigs and production systems has the potential to cause physical impact to historic archaeological resources. The area of seafloor disturbance from each of these structures is defined in Chapter 4.1.1.3.2.1 of the Multisale EIS. Pile driving associated with platform emplacement may also cause sediment liquefaction an unknown distance from the piling, disrupting stratigraphy in the area of liquefaction.

Pipeline placement has the potential to cause a physical impact to historic archaeological resources. Pipelines placed in water depths of <61 m (200 ft) must be buried. Burial depths of 1 m (3.28 ft) are required, with the exception of shipping fairways and anchorage areas, where the requirements are 3.0 m (9.84 ft) and 4.6 m (15 ft), respectively.

The dredging of new channels, as well as maintenance dredging of existing channels, has the potential to cause a physical impact to historic shipwrecks (Espey, Huston, & Associates, 1990a). There are many navigation channels that provide OCS access to onshore facilities. Most of these channels are located in the CPA.

Anchoring associated with platform and pipeline emplacement, as well as with service-vessel and shuttle-tanker activities, may also physically impact historic archaeological resources. It is assumed that during pipeline emplacement, an array of eight 20,000-lb anchors is continually repositioned around the pipelaying barge.

Activities resulting from a proposed action would generate ferromagnetic structures and debris, which would tend to mask magnetic signatures of significant historic archaeological resources. The task of locating historic resources through an archaeological survey is, therefore, made more difficult as a result of leasing activity.

The loss of ferromagnetic debris during exploration and production activities has the potential to mask the magnetic signatures of historic shipwrecks. Under a proposed action, it is expected that hundreds of tons of ferromagnetic debris would be lost overboard. It is expected that most ferromagnetic debris associated with OCS structures would be removed from the seafloor during site-clearance activities. Site clearance, however, takes place after the useful life of the structure is complete. It has been noted that such debris has the potential to be moved from the area of initial deposition as a result of trawling activities (Garrison et al., 1989). Also, no site-clearance activities are required for pipeline emplacement operations. Therefore, there remains the potential for masking the signatures of historic shipwrecks as a result of ferromagnetic debris from OCS oil and gas activities.

Since all platform locations within the high-potential areas for the occurrence of offshore historic archaeological resources are given archaeological clearance prior to setting the structure, removal of the structure should not result in any adverse impact to archaeological resources. This is consistent with the findings of the *Programmatic Environmental Assessment: Structure Removal Activities, Central and Western GOM Planning Areas* (USDOI, MMS, 1987).

Onshore historic properties include sites, structures, and objects such as historic buildings, forts, lighthouses, homesteads, cemeteries, and battlefields. Sites already listed on the National Register of Historic Places and those considered eligible for the Register have already been evaluated as being able to make a unique or significant contribution to science. Historic sites that have yet to be identified may contain unique historic information and would have to be assessed after discovery to determine the importance of the data.

Onshore development could result in the direct physical contact between the construction of new onshore facilities or pipeline canals and previously unidentified historic sites. This direct physical contact with a historic site could cause physical damage to, or complete destruction of, information on the history of the region and the Nation. Except for the projected 0-1 new gas processing plant and 0-1 new pipeline landfall, a proposed action would require no new oil and gas coastal infrastructure. Any facilities to be constructed must receive approval from the pertinent Federal, State, county/parish, and/or communities involved. Protection of archaeological resources in these cases is expected to be achieved through the various approval processes involved. There is, therefore, no expected impact to onshore historic sites in the CPA or WPA from onshore development.

Maintenance dredging in support of activities resulting from a proposed action has the potential to impact a historic shipwreck. For instance, maintenance dredging in the Port Mansfield Entrance Channel is believed to have impacted the *Santa Maria de Yciar*, which sank on April 29, 1554 (Espey, Huston &

Associates, 1990a). Impacts from maintenance dredging can be attributed proportionally to the users of the navigation channels. The MMS assessment indicates that, under a proposed action, <1 percent of the ship traffic through the Port Mansfield Cut is related to OCS use. Therefore, the impact to the *Santa Maria de Yciar* directly attributable to traffic and maintenance dredging as a result of the OCS Program is negligible. As these shipwrecks are unique historic archaeological resources, maintenance dredging, in general, is responsible for impacts to historic shipwrecks. Proposed-action activities represent <1 percent of the usage of the major navigation channels along the Gulf Coast.

In order to reduce the risk of impacting a historic shipwreck during an MMS-permitted activity, the MMS requires a 50-m (164-ft) remote-sensing survey linespacing for historic shipwreck surveys in water depths ≤200 m (656 ft) and a 300-m (984-ft) remote-sensing survey linespacing for historic shipwreck surveys in water depths >200 m (656 ft). The current NTL—NTL 2005-G07, effective July 1, 2005—supersedes all other archaeological NTL's and LTL's, and updates requirements to reflect current technology. The list of lease blocks requiring an archaeological survey and assessment are identified in NTL 2006-G07.

CPA Proposed Action Analysis

According to projections presented in **Table 3-2**, under a proposed action, 404-576 exploration, delineation, and development wells would be drilled, and 28-40 production platforms would be installed as a result of a CPA proposed action, including the 181 South Area. Relative-sea-level data for the Gulf of Mexico indicates that there is very low potential for the occurrence of prehistoric archaeological sites in water depths >60 m (197 ft). If only the area likely to contain prehistoric sites (shallower than 60 m or 197 ft) is considered, 77-88 exploration, delineation, and development wells and 20-21 production platforms are projected to be installed (**Table 3-3**). The limited amount of impact to the seafloor throughout the CPA, the required archaeological survey, and the archaeological clearance are sufficient to assume a low potential for impacting a prehistoric archaeological site. Should such an impact occur, damage to or loss of significant or unique prehistoric archaeological information could occur.

Of the total estimated number of exploration, delineation, and development wells identified in **Table 3-2**, 108-126 wells would be drilled and 22-24 platforms would be installed in water depths of 200 m (656 ft) or less, where the majority of blocks having a high potential for historic period shipwrecks are located. The location of any proposed activity within a lease that has a high potential for historic shipwrecks requires archaeological clearance prior to operations.

Generally, in the eastern part of the CPA, where unconsolidated sediments are thick, it is likely that side-scan sonar would not detect shipwrecks buried beneath the mud. In this area, which begins nearshore around the Vermilion Area (USDOI, MMS, 1984) and extends eastward, the effectiveness of the survey for detecting historic shipwrecks of composite and wooden construction would depend on the capability of a magnetometer to detect ferromagnetic masses of the size characteristically associated with shipwrecks. It is assumed that the required 50-m (164-ft) linespacing (as specified in NTL 2005-G07) is a highly effective survey methodology, allowing detection and avoidance of historic shipwrecks within the survey area. The survey would therefore minimize the potential impacts to historic shipwrecks.

Because there is only a thin Holocene sediment veneer overlying an overconsolidated Pleistocene surface in the western part of the CPA, shipwrecks are more likely to be detected by side-scan sonar; therefore, the 50-m (164-ft) survey linespacing is expected to be even more effective for reducing the potential for a direct physical contact between an impact-producing factor and a shipwreck in the western part of the CPA. There is a very small possibility that a historic shipwreck could be impacted by OCS activities. Should such an impact occur, however, significant or unique archaeological information could be lost.

Considering that the expanded MMS shipwreck database contains 954 reported shipwrecks in the entire CPA (**Table 4-10**) and that an archaeological survey and assessment is required in all lease blocks identified as having a high potential for containing historic shipwrecks, the probability of an OCS activity contacting and damaging a shipwreck is very low. If an oil and gas structure contacted a historic resource, however, there could be a loss of significant or unique archaeological information.

WPA Proposed Action Analysis

According to projections presented in **Table 3-3**, under a proposed action, 197-287 exploration, delineation, and development wells would be drilled, and 28-41 production platforms would be installed as a result of a WPA proposed action. Relative sea-level data for the Gulf of Mexico indicates that there is very low potential for the occurrence of prehistoric archaeological sites in water depths >60 m (>197 ft). If only the area likely to contain prehistoric sites (shallower than 60 m or 197 ft) is considered, 87-125 exploration, delineation, and development wells and 21-31 production platforms are projected to be installed (**Table 3-3**). The limited amount of impact to the seafloor throughout the WPA, the required archaeological survey, and the archaeological clearance are sufficient to assume a low potential for impacting a prehistoric archaeological site. Should such an impact occur, damage to or loss of significant or unique prehistoric archaeological information could occur.

Of the total estimated number of exploration, delineation, and development wells and production platforms identified in **Table 3-3**, 105-147 exploration, delineation, and development wells would be drilled and 23-33 platforms would be installed in water depths of 200 m (656 ft) or less, where the majority of blocks having a high potential for historic period shipwrecks are located. The location of any proposed activity within a lease that has a high potential for historic shipwrecks requires archaeological clearance prior to operations. Because there is only a thin Holocene sediment veneer overlying an indurated Pleistocene surface in the eastern part of the WPA, shipwrecks are more likely to be detected by side-scan sonar; therefore, the 50-m (164-ft) survey linespacing is expected to be even more effective for reducing the potential for a direct physical contact between an impact-producing factor and a shipwreck in the eastern WPA. Considering that the expanded MMS shipwreck database contains 516 reported shipwrecks in the entire WPA (**Table 4-10**) and that an archaeological survey and assessment is required in all lease blocks identified as having a high potential for containing historic shipwrecks, the potential of an OCS activity contacting and damaging a shipwreck is very low. If an oil and gas structure contacted a historic resource, however, there could be a loss of significant or unique archaeological information.

Summary and Conclusion

The greatest potential impact to an archaeological resource as a result of a CPA or 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 or historic site. Given the extreme water depths in the 181 South Area, no prehistoric archaeological resources could be encountered in this area. However, there is a potential of contact with historic archaeological resources. The archaeological survey and archaeological clearance of sites required prior to an operator beginning oil and gas activities on a lease are expected to be highly effective at identifying possible archaeological sites. Since the survey and clearance provide a significant reduction in the potential for a damaging interaction between an impact-producing factor and an archaeological site, there is a very small possibility of an OCS activity contacting an archaeological site in those lease blocks that require a high-resolution survey. Should such contact occur, there would be damage to or loss of significant and/or unique archaeological information.

An MMS-funded study (Pearson et al., 2003) resulted in refinement of the areas assessed as having a high potential for the location of historic period shipwrecks. An MMS review of the historic high-potential areas for historic shipwrecks is occurring at the time of this writing. The NTL for archaeological resource surveys in the Gulf of Mexico Region, NTL 2005-G07, mandates a 300-m (984-ft) linespacing for remote-sensing surveys of leases within areas having a high potential for prehistoric sites; a 50-m (164-ft) linespacing of leases within the areas having a high potential for historic shipwrecks in water depths 200 m (656 ft) or less, and a 300-m (984-ft) linespacing in water depths >200 m (656 ft). NTL 2006-G07 identifies those lease blocks that have been designated as having a high potential for containing archaeological resources.

Except for the projected 0-1 new gas processing plants and 0-1 new pipeline landfall, a CPA or 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.

Offshore oil and gas activities resulting from a proposed action could contact an archaeological resource because of incomplete knowledge on the location of these sites in the Gulf. Although this occurrence is not probable, such an event would result in the disturbance or destruction of important archaeological information. Under 30 CFR 250.194(c) and 30 CFR 250.1010(c), lessees are required to notify the MMS within 48 hr of the discovery of any potential archaeological resources.

4.1.15.3. Impacts of Accidental Events

Spills, collisions, and blowouts are accidental events that can happen in association with a CPA or WPA proposed action. If an accidental event occurs as a result of one of these events, there could be an impact to archaeological resources. Oil spills in the CPA or WPA have the potential to affect both prehistoric and historic archaeological resources. Impacts to historic resources would be limited to visual impacts and, possibly, physical impacts associated with spill cleanup operations. Impacts to prehistoric archaeological sites would be the result of hydrocarbon contamination of organic materials, which have the potential to date site occupation through radiocarbon dating techniques, as well as possible physical disturbance associated with spill cleanup operations. A detailed description of the possible effects of accidental events associated with a CPA and WPA proposed action on archaeological resources can be found in Chapter 4.4.13 of the Multisale EIS.

Prehistoric Archaeological Resources

Prehistoric archaeological sites on barrier islands and along beaches may be damaged by oil spilled as the result of an accidental event. The risk of oil spills occurring and contacting coastal areas is described in Chapter 4.3.1 of the Multisale EIS and in **Chapter 3.2.1** of this SEIS. Direct physical contact of spilled oil with a prehistoric site could coat fragile artifacts or site features with oil. The potential for radiocarbon-dating organic materials in the site also could be adversely affected. Ceramic or lithic seriation or other relative dating techniques might ameliorate this loss of information. It is also possible to decontaminate an oiled sample for radiocarbon dating. Investigations into archaeological damage associated with the *Exxon Valdez* oil spill in the Gulf of Alaska revealed that oil did not penetrate the subsoil or into wooden artifacts in the intertidal zone, apparently because of hydrostatic pressure (*Federal Archaeology*, 1994); however, it is not certain that this finding would hold true in the Gulf of Mexico coastal region.

Coastal prehistoric sites could experience an impact from oil-spill cleanup operations, including possible site looting from oil-spill cleanup crews. Cleanup equipment could destroy fragile artifacts and disturb the provenience of artifacts and site features. Some of the coastal prehistoric sites that might be impacted by beach cleanup operations may contain unique and significant scientific information. Should an oil spill contact a coastal prehistoric site, there could be a loss of significant archaeological information on the prehistory of North America and the Gulf Coast region.

Historic Archaeological Resources

The risk of contact to archaeological resources from oil spills associated with proposed-action operations is described in Chapter 4.3.1.8 of the Multisale EIS. Should an oil spill contact a coastal historic site, such as a fort or a lighthouse, the major impact would be a visual impact from oil contact and contamination of the site and its environment. Impacts to coastal historic sites are expected to be temporary and reversible. Should such an oil spill contact an onshore historic site, the effects would be temporary and reversible.

Oil released subsea as a result of a blowout or pipeline incident would not be expected to contact an offshore sunken historic resource such as a shipwreck.

Summary and Conclusion

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. As indicated in Chapter 4.3.1.8 of the Multisale EIS, it is not very likely for an oil spill to occur and contact coastal and barrier island prehistoric sites as a result of a CPA or WPA proposed action. The proposed actions, therefore, are not expected to result in impacts to prehistoric archaeological sites; however, should such an impact occur, unique or significant archaeological information could be lost and this impact would be irreversible.

Impacts to a historic archaeological resource could also occur as a result of an accidental spill. As indicated in Chapter 4.3.1.8 of the Multisale EIS, it is not very likely that an oil spill would occur and contact coastal historic archaeological sites from accidental events associated with a CPA or WPA 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. As historic archaeological sites are protected under law, it is expected that any spill cleanup operations would be conducted in such a way as to cause little or no impacts to historic archaeological resources. These impacts would be temporary and reversible.

4.1.15.4. Cumulative Impacts

A detailed description of cumulative impacts on archaeological resources can be found in Chapter 4.5.14 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of this SEIS. The analysis of these impacts applies to the CPA, including the 181 South Area, and the WPA.

Prehistoric Archaeological Resources

As a result of future OCS exploration and development activities in the Gulf of Mexico during the 40-year analysis period projects drilling 12,966-14,187 exploration, delineation, and development wells in water depths <60 m (197 ft) (Table 4-4 of the Multisale EIS). Relative sea-level curves for the Gulf of Mexico indicate there is very low potential for the occurrence of prehistoric archaeological sites in water depths >60 m (197 ft). Archaeological surveys are assumed to be highly effective in reducing the potential for an interaction between an impact-producing activity and a prehistoric resource. Archaeological surveys were first required for Lease Sale 32 held in December 1973; therefore, it is assumed that the major impacts to prehistoric resources that may have occurred resulted from development prior to this time. The potential of an interaction between rig or platform emplacement and a prehistoric site is diminished by the survey, but it still exists. Such an interaction would result in the loss of or damage to significant or unique prehistoric information.

The placement of 2,530-18,790 km (1,852-13,739 mi) and 2,340-9,580 km (1,454-5,953 mi) of pipelines in water depths <60 m (197 ft) is projected over the 40-year analysis period as a result OCS Program activities in the CPA (including the 181 South Area) and WPA, respectively. For the OCS Program, 5,320-31,690 km (5,320-19,691 mi) of pipelines are projected in water depths <60 m (197 ft). While the archaeological survey minimizes the chances of impacting a prehistoric site, there remains a possibility that a site could be impacted by pipeline emplacement. Such an interaction would result in the loss of significant or unique archaeological information.

The setting of anchors for drilling rigs, platforms, and pipelaying barges, and anchoring associated with oil and gas service-vessel trips to the OCS have the potential to impact shallowly buried prehistoric sites. Archaeological surveys minimize the chance of impacting these sites; however, these surveys are not seen as infallible and the chance of an impact from future activities exists. Impacts from anchoring on a prehistoric site may have occurred during past OCS activities. Such an interaction could result in the loss of significant or unique archaeological information.

The probabilities of offshore oil spills ≥1,000 bbl occurring from the OCS Program in the cumulative activity area is presented in Chapter 4.3.1 of the Multisale EIS. Oil spills have the potential to impact coastal prehistoric sites directly or indirectly by physical impacts caused by oil-spill cleanup operations. Coastal, oil-spill scenario numbers are presented in Table 4-13 of the Multisale EIS for both OCS and non-OCS sources. It is assumed that the majority of the spills would occur around terminals and would be contained in the vicinity of the spill. There is a small possibility of these spills contacting a prehistoric site. Contamination of organic site materials by hydrocarbons can make radiocarbon dating of prehistoric sites more difficult or even impossible. This loss might be ameliorated by using artifact seriation or other relative dating techniques. Coastal prehistoric sites might also suffer direct impact from oil-spill cleanup operations as well as looting. Interaction between oil-spill cleanup equipment or personnel and a site could destroy fragile artifacts or disturb site context, possibly resulting in the loss of information on the prehistory of North America and the Gulf Coast region. Some coastal sites may contain significant or unique information.

Most channel dredging occurs at the entrances to bays, harbors, and ports. Bay and river margins have a high potential for the occurrence and preservation of prehistoric sites. Prior channel dredging has disturbed buried and/or inundated prehistoric archaeological sites in the coastal plain of the Gulf of Mexico. It is assumed that some of the sites or site information were unique or significant. In many areas, COE requires surveys prior to dredging activities to minimize such impacts.

Trawling activity would only affect the uppermost portion of the sediment column (Garrison et al., 1989). This zone would already be disturbed by natural factors, and site context to this depth would presumably be disturbed. Therefore, no effect of trawling on prehistoric sites is assumed.

Table 4-9 of the Multisale EIS indicates the projected coastal infrastructure related to OCS Program activities in the cumulative activity area. Investigations prior to construction can determine whether prehistoric archaeological resources occur at these sites.

Because MMS does not have jurisdiction over pipelines in State waters, the archaeological resource protection requirements of the National Historic Preservation Act (NHPA) are not within MMS's jurisdiction. However, other Federal agencies, such as COE, which lets permits associated with pipelines in State waters, are responsible for the protection of archaeological resources under the NHPA. Therefore, the impacts that might occur to archaeological resources by pipeline construction within State waters should be mitigated under the requirements of the NHPA.

About half of the coast along the northern Gulf was hit with 16-20 tropical cyclones between the years 1901 and 1955 (DeWald, 1982). Prehistoric sites in shallow waters and on coastal beaches are exposed to the destructive effects of wave action and scouring currents. Under such conditions, it is highly likely that artifacts would be dispersed and the site context disturbed. Some of the original information contained in the site would be lost in this process. Overall, a significant loss of data from prehistoric sites has probably occurred, and would continue to occur, in the northeastern Gulf from the effects of tropical storms and hurricanes.

Historic Archaeological Resources

Archaeological surveys are assumed to be highly effective in reducing the potential for an interaction between an impact-producing activity and a historic resource. The surveys are expected to be most effective in areas where there is only a thin veneer of unconsolidated Holocene sediments. In these areas, shipwreck remains are more likely to be exposed at the seafloor where they can be detected by the side-scan sonar as well as the magnetometer. In areas of thicker unconsolidated sediments, shipwreck remains are more likely to be completely buried with detection relying solely on the magnetometer. According to estimates presented in Table 4-4 of the Multisale EIS, an estimated 38,677-45,338 exploration, delineation, and development wells would be drilled, and 2,958-3,262 production platforms would be installed during the 40-year analysis period as a result of the OCS Program. Of this range, between 19,840 and 22,216 exploration, delineation, and development wells would be drilled, and 2,779-2,991 production structures would be installed in water depths of 200 m (656 ft) or less. The majority of lease blocks in this water depth have a high potential for historic shipwrecks. Archaeological surveys were first required for Lease Sale 32 held in December 1973; therefore, it is assumed that any major impacts to historic resources that may have occurred resulted from development prior to this time.

Of the 17,785 lease blocks in the OCS Program area, less than half of these blocks are leased. There are 3,726 blocks that fall within the Gulf of Mexico Region's high-potential areas for historic resources. Of these blocks, 2,095 blocks are in water depths of 200 m (656 ft) or less and would require a survey at the 50-m (164-ft) linespacing. The potential of an interaction between rig or platform emplacement and a historic shipwreck is greatly diminished by requisite site surveys, but it still exists. Such an interaction could result in the loss of or damage to significant or unique historic resources.

Table 4-4 of the Multisale EIS indicates the placement of between 9,470 and 66,550 km (5,884-41,352 mi) of pipelines is projected in the cumulative activity area. While the required archaeological survey minimizes the chances of impacting a historic shipwreck, there remains a possibility that a wreck could be impacted by pipeline emplacement. Such an interaction could result in the loss of significant or unique historic resources.

The setting of anchors for drilling rigs, platforms, and pipeline lay barges, and anchoring associated with oil and gas service-vessel trips to the OCS have the potential to impact historic wrecks. Archaeological surveys serve to minimize the chance of impacting historic wrecks; however, these surveys are not infallible and the chance of an impact from future activities does exist. Impacts from anchoring on a historic shipwreck may have occurred. There is also a potential for future impacts from anchoring on a historic shipwreck. Such an interaction could result in the loss of or damage to significant or unique historic resources and the scientific information they contain.

The probabilities of offshore oil spills ≥1,000 bbl occurring from OCS Program activities is presented in Chapter 4.3.1 of the Multisale EIS. Oil spills have the potential to impact coastal historic sites directly or indirectly by physical impacts caused by oil-spill cleanup operations. The impacts caused by oil spills to coastal historic archaeological resources are generally short term and reversible. Table 4-14 of the Multisale EIS presents the coastal spill scenario from both OCS and non-OCS sources. It is assumed that the majority of the spills would occur around terminals and would be contained in the vicinity of the spill. Should such oil spills contact a historic site, the effects would be temporary and reversible.

Most channel dredging occurs at the entrances to bays, harbors, and ports. These areas have a high potential for historic shipwrecks; the greatest concentrations of historic wrecks are likely associated with these features (Pearson et al., 2003). It is reasonable to assume that significant or unique historic archaeological information has been lost as a result of past channel dredging activity. In many areas, COE requires remote-sensing surveys prior to dredging activities to minimize such impacts.

Past, present, and future OCS oil and gas exploration and development and commercial trawling would result in the deposition of tons of ferromagnetic debris on the seafloor. Modern marine debris associated with these activities would tend to mask the magnetic signatures of historic shipwrecks, particularly in areas that were developed prior to requiring archaeological surveys. Such masking of the signatures characteristic of historic shipwrecks may have resulted or may yet result in OCS activities in the cumulative activity area impacting a shipwreck containing significant or unique historic information.

Trawling activity would specifically only affect the uppermost portions of the sediment column (Garrison et al., 1989). On many wrecks, the uppermost portions would already be disturbed by natural factors and would contain only artifacts that have lost all original context.

Because MMS does not have jurisdiction over pipelines in State waters, the archaeological resource protection requirements of the NHPA are not under the jurisdiction of MMS in those areas. However, other Federal agencies, such as COE, which issues permits associated with pipelines in State waters, are responsible for the protection of archaeological resources under the NHPA. Therefore, the impacts that might occur to archaeological resources by OCS-related pipeline construction within State waters should be mitigated under the requirements of the NHPA.

Sport diving and commercial treasure hunting are significant factors in the loss of historic data from wreck sites. Efforts to educate sport divers and to foster the protection of historic shipwrecks, such as, those of the Texas Historical Commission and the Southwest Underwater Archaeological Society (Arnold, personal communication, 1997), will serve to lessen these potential impacts. While commercial treasure hunters generally impact wrecks with intrinsic monetary value, sport divers may collect souvenirs from all types of wrecks. Since the extent of these activities is unknown, the impact cannot be quantified. A Spanish war vessel, *El Cazador*, was discovered in the Central Gulf of Mexico. The vessel contained a large amount of silver coins and has been impacted by treasure-hunting salvage operations (*The Times Picayune*, 1993). The historic data available from this wreck and from other wrecks that have been impacted by treasure hunters and sport divers represent a significant or unique loss.

Tropical storms and hurricanes are normal occurrences in the Gulf of Mexico and along the Gulf Coast. On average, 15-20 hurricanes make landfall along the northern Gulf Coast per decade. Shipwrecks in shallow waters are exposed to a greatly intensified, longshore current during tropical storms and hurricanes (Clausen and Arnold, 1975). Under such conditions, it is highly likely that artifacts (e.g., ceramics and glass) would be dispersed. Some of the original information contained in the site would be lost in this process, but a significant amount of information would also remain. Overall, a significant loss of data from historic sites has probably occurred, and will continue to occur, in the northeastern Gulf from the effects of tropical storms and hurricanes. Some of the data lost have most likely been significant or unique. The MMS is currently funding a study to identify potential impacts from recent hurricane activity on historic shipwrecks in the Gulf of Mexico. A final report of findings is expected from this study in January 2009.

Summary and Conclusion

Several impact-producing factors may threaten archaeological resources. An impact could result from a contact between an OCS activity (i.e., pipeline and platform installations, drilling rig emplacement and operation, dredging, and anchoring activities) and a prehistoric site or historic shipwreck located on the continental shelf. The archaeological surveys and resulting archaeological analysis and clearance that are required prior to an operator beginning oil and gas activities in a lease area are expected to be highly effective at identifying and avoiding possible archaeological resources. The OCS development prior to requiring archaeological surveys has possibly impacted sites containing significant or unique archaeological information.

Oil spills have the potential to impact coastal prehistoric sites directly or indirectly by physical impacts caused by oil-spill cleanup operations. Should an oil spill occur and contact a coastal prehistoric site, loss of significant or unique information could result. The loss or discard of ferromagnetic debris associated with oil and gas exploration and development and trawling activities could result in the masking of historic shipwrecks.

The loss of significant or unique archaeological information from commercial fisheries (trawling) is not expected. It is expected that dredging, sport diving, commercial treasure hunting, and tropical storms and hurricanes have impacted and will continue to impact archaeological resources. However, the shallow depth of sediment disturbance caused by commercial fisheries activities (trawling) is not expected to exceed that portion of the sediments that have already been disturbed by wave-generated factors, and is therefore not expected to impact prehistoric resources. It is possible that explosive seismic surveys on the OCS and within State waters, prior to 1989, could have impacted archaeological resources. Explosive seismic charges set near historic shipwrecks could have displaced the vessel's surrounding sediments, acting like a small underwater fault and moving fragile wooden, ceramic, and metal remains out of their initial cultural context. Such an impact would have resulted in the loss of significant or unique archaeological information.

Onshore development as a result of a CPA or 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 loss of significant or unique historic 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 a CPA or WPA proposed action is expected to be very small due to the efficacy of the required remote-sensing survey and archaeological report. However, there is a possibility of an interaction between bottom-disturbing activity (rig emplacement, pipeline trenching, and anchoring) and an archaeological site.

4.1.16. Human Resources and Land Use

4.1.16.1. Land Use and Coastal Infrastructure

The MMS has reexamined the analysis for land use and coastal infrastructure presented in the Multisale EIS, based on the additional (mainly supplemental) information presented below and the addition of the 181 South Area to the proposed CPA sale area. Although the addition of the 181 South Area resulted in some increases in the activity scenario for a typical CPA proposed action, these minor increases in activity were not significant enough to affect the long-term (i.e., 40-year) forecasts of coastal infrastructure needs to support either a typical CPA sale or the OCS Program. To date, no new information has been found that necessitates a change to the coastal infrastructure scenario presented in the Multisale EIS. The MMS recently analyzed historical data and validated past scenario projections of new pipeline landfalls and new onshore waste disposal sites. Based on the lack of significant new information and MMS's recent analysis, the coastal infrastructure projections have not changed for a proposed lease sale or for the OCS Program.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. A CPA (i.e., including the 181 South Area) or WPA proposed action would not require additional coastal infrastructure, with the exception of possibly one new gas processing facility and one new pipeline landfall, and 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 a 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 the cleanup of any oil or chemicals spilled. The incremental contribution of a proposed action to the cumulative impacts on land use and coastal infrastructure are expected to be minor.

4.1.16.1.1. Description of the Affected Environment

The primary region of geographic influence of the proposed actions is coastal Texas and Louisiana, with a lesser influence on coastal Mississippi and Alabama and limited sale-related activities occurring in the Florida area. Land use in this area has not significantly changed since the Multisale EIS (Chapter 3.3.5.1.2) and that description is summarized here. According to the U.S. Dept. of Agriculture's Economic Research Service (ERS) classifications, 5 of 132 counties/parishes in the analysis area are classified as farming dependent, 9 as mining dependent (suggesting the importance of oil and gas development), 27 as manufacturing dependent, 30 as government employment centers, and 21 as tied to service employment (U.S. Dept. of Agriculture, ERS, 2004). The ERS also classifies 39 of the counties/parishes as major retirement destinations and 7 of the rural ones as recreation dependent. Important cities include Baton Rouge, Beaumont, Corpus Christi, Galveston, Houston, Lafayette, Lake Charles, Mobile, New Orleans, Pascagoula, and Port Arthur.

The Texas Gulf coastal plain constitutes over one-third of the State and includes forest, cattle and farmlands, major cities of commerce and education, tourist locales, Federal installations, and major ports. The oil and gas industry has been part of its economy since the early 1900's. The majority of oil and gas corporations have headquarters in Houston. The military also has a significant presence.

The Louisiana coastal area includes broad expanses of marshes and swamps interspersed with ridges of higher well-drained land. Southeastern Louisiana is a thriving metropolitan area hosting shipping, navigation, U.S. Navy facilities, and oil and chemical refineries. Historically, Terrebonne, Plaquemines, and Lafourche Parishes have been the primary staging and support area for offshore oil and gas exploration and development.

Coastal Mississippi includes bays, deltas, marshland, and waterways. Two-thirds of it is devoted to State-chartered, beachfront gambling enterprises and heavy tourism. One-third is industrial—oil refining and shipbuilding, boat and helicopter facilities, and an onshore support base for drilling and production.

Coastal resource-dependent industries in Alabama include navigation, tourism, marine recreation, commercial fishing, and, since its 1979 discovery in State waters, natural gas development and production. The military has had a long presence in the area.

See Chapter 3.3.3 of the Multisale EIS for a listing of major public, recreational, and conservation areas; Chapter 3.3.5.6 of the Multisale EIS for a discussion of major ports and waterways; and Chapter 3.3.3 and Figures 3-13 through 3-15 of the Multisale EIS for a description of OCS infrastructure.

4.1.16.1.2. Impacts of Routine Events

Background/Introduction

Chapter 4.1.2.1 of the Multisale EIS describes the potential need for the construction of new facilities and/or the expansion at existing facilities that could result from a proposed action and the OCS Program. Up to one new pipeline landfall and up to one new gas processing plant was projected as a result of an individual proposed lease sale. At present, there is considerable excess gas capacity in the Gulf of Mexico. However, near the end of the 40-year life of a proposed action, 0-1 new facilities are expected to be constructed as a result of a CPA or WPA proposed action. The MMS projected no other new coastal infrastructure as a result of an individual proposed lease sale. A proposed action may contribute to the use of existing and projected facilities. The MMS stated that no new navigation channels are expected to be dredged as a result of a proposed action; however, a proposed action would contribute to maintenance dredging of existing navigational canals. It should be noted that MMS is not a permitting agency of onshore infrastructure. The permitting agencies would be COE and the State in which the activity has or would occur.

The MMS projected the number of Federal OCS landfalls that may result from proposed lease sales in order to analyze the potential impacts to wetlands and other coastal habitats. In the Multisale EIS and other previous EIS's and EA's, MMS assumed that the majority of new Federal OCS pipelines would connect to the existing infrastructure in Federal and State waters and that very few would result in new pipeline landfalls. Therefore, MMS projected up to one pipeline landfall per lease sale; however, recent MMS analysis showed that even one landfall as a result of an individual lease sale may be unlikely (USDOI, MMS, 2007f). This analysis confirms MMS's assumption that the majority of new pipelines constructed would connect to the existing infrastructure in Federal and State waters and that very few would result in new pipeline landfalls. Although there will be some instances where new pipelines may need to be constructed, there is nothing to suggest any dramatic shifts in the trends in new Federal OCS landfalls given the current outlook for Gulf of Mexico development, particularly in coastal Louisiana (Dismukes, personal communication, 2007). While there are some opportunities for new pipeline landfalls from increased production activity, many of those will be limited due to a number of factors associated with basic pipeline economics.

The analyses of coastal infrastructure presented in the Multisale EIS and other previous EIS's and EA's concluded that no new solid-waste facilities would be built as a result of a single lease sale or as a result of the OCS Program. Recent research further supports these past conclusions that existing solid-waste disposal infrastructure is adequate to support both existing and projected offshore oil and gas drilling and production needs (Dismukes et al., 2007).

To date, no new information has been found that necessitates a change to the coastal infrastructure scenario presented in the Multisale EIS. Although the addition of the 181 South Area slightly increased some of the activity scenario parameters (e.g., production) for a typical CPA proposed action, the relatively small increase was not enough to change the long-term (i.e., 40-year) forecasts of coastal infrastructure needs to support OCS activity. The MMS also recently analyzed historical data and validated past scenario projections of new pipeline landfalls and new onshore waste disposal sites. Based on the lack of significant new information and MMS's recent analyses supporting the estimates, the coastal infrastructure projections used in the Multisale EIS are still considered to be the best available.

CPA Proposed Action Analysis

A detailed impact analysis of the routine impacts of a CPA proposed action on land use and coastal infrastructure can be found in Chapter 4.2.2.1.15.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS, as well as new information relevant to the addition of the 181 South Area to the proposed CPA sale area.

The MMS reviewed existing exploration and development plans near the 181 South Area. All plans reviewed identified Port Fourchon as the primary service base; however, for some plans other bases were identified instead of Port Fourchon for either crew or helicopter (i.e., Galliano and Venice, Louisiana), or as a backup to Port Fourchon (i.e., Venice, Louisiana).

For the near term, Port Fourchon would most likely be the primary service base to support oil and gas activity in the 181 South Area. Because of the limited amount of land available at Port Fourchon, the port may face capacity constraints in the long term. Operators are also looking to diversity risk from shutdowns like those experienced after Hurricanes Katrina and Rita, and are therefore likely to look to other ports. Thus, in the longer term, other deepwater access ports such as Theodore and Mobile, Alabama, and Pascagoula, Mississippi, could also support the 181 South Area.

For the 181 South Area scenario analysis, MMS estimates that there would be approximately 4 trips per week by supply vessels to a facility during drilling and production, approximately 8 trips per week by crew boats during drilling operations, and approximately 14 helicopter round trips per week to a production facility.

A 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 would not alter the current land use of the analysis area. 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.

No recent information was found that would necessitate a reanalysis of the impacts of a CPA proposed action upon land use and coastal infrastructure. Although the addition of the 181 South Area slightly increased some of the activity scenario parameters (e.g., production) for a typical CPA proposed action, the relatively small increase was not enough to change the long-term (i.e., 40-year) forecasts of coastal infrastructure needs to support OCS activity. The analysis and potential impacts detailed in the Multisale EIS apply for the new CPA area that includes the 181 South Area.

The existing oil and gas infrastructure is expected to be sufficient to handle development associated with a proposed action. A proposed CPA lease sale would not alter the current land use of the area.

WPA Proposed Action Analysis

A detailed impact analysis of the routine impacts of a WPA proposed action on land use and coastal infrastructure can be found in Chapter 4.2.1.1.13.1 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

A WPA proposed action would not require additional coastal infrastructure, with the exception of possibly one new gas processing facility and one new pipeline landfall, and would not alter the current land use of the analysis area. 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.

No recent information was found that would necessitate a reanalysis of the impacts of a WPA proposed action upon land use and coastal infrastructure. As discussed above, MMS recently analyzed historical data and validated past scenario projections of new pipeline landfalls and new onshore waste disposal sites. Based on the lack of significant new information and MMS's recent analyses supporting the estimates, the coastal infrastructure projections used in the Multisale EIS are still considered to be the best available.

The existing oil and gas infrastructure is expected to be sufficient to handle development associated with a proposed action. A proposed WPA lease sale would not alter the current land use of the area.

Summary and Conclusion

Routine activities as the result of a CPA or WPA proposed action would not require additional coastal infrastructure, with the exception of possibly one new gas processing facility and one new pipeline landfall, and 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 a 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.

No recent information was found that would necessitate a reanalysis of the impacts of a CPA or WPA proposed action upon land use and coastal infrastructure. Although the addition of the 181 South Area slightly increased some of the activity scenario parameters (e.g., production) for a typical CPA proposed action, the relatively small increase was not enough to change the long-term (i.e., 40-year) forecasts of coastal infrastructure needs to support OCS activity. The analysis and potential impacts detailed in the Multisale EIS apply for the new CPA area that includes the 181 South Area.

4.1.16.1.3. Impacts of Accidental Events

Background/Introduction

The accidental events associated with a CPA or WPA proposed action that would most likely impact coastal infrastructure and land use include oil spills, chemical spills, and vessel collisions. Impacts from well blowouts in the OCS are expected to be short-term and localized, and thus not likely to affect either coastal infrastructure or land use in the Gulf of Mexico.

Spills can be associated with the exploration, production, or transportation phases of a CPA or WPA proposed action. The risk of oil-spill events as a result of a proposed action are discussed in depth in Chapter 4.3.1 of the Multisale EIS, while vessel collisions and chemical and drilling-fluid spills are discussed in Chapters 4.3.3 and 4.3.4, respectively.

Oil spilled in the offshore areas is usually localized and has a low probability of contacting coastal areas; much of the oil volatilizes or is dispersed by currents. Oil produced from the 181 South Area is anticipated to have a high concentration of hydrocarbon compounds and, thus, it is projected to linger in the environment longer than oil from other areas that are composed of more volatiles. However, the Sale 181 Area is approximately 130 mi (209 km) from the nearest shore. Moreover, the additional production from this area does not increase the overall risk of a large spill occurring in the Gulf of Mexico.

CPA Proposed Action Analysis

The accidental events associated with a CPA proposed action that would most likely impact coastal infrastructure and land use include oil spills, chemical spills, and vessel collisions. Spills can be associated with the exploration, production, or transportation phases of a proposed action.

Both coastal or nearshore spills and vessel collisions could have short-term adverse effects on the operations of coastal infrastructure facilities. For example, on June 21, 2006, an oil spill occurred in the Calcasieu Parish Ship Channel in Lake Charles, Louisiana. The spill caused the Channel to be closed to all maritime traffic between lights 112 and 100 (World Marine News, 2006). The 11-mi (18-km) stretch of closed waterway caused a backup of vessels, six of which were carrying crude. In response to the loss of imports, Conoco Phillips and Citgo asked for oil to be lent to their refineries from the Strategic Petroleum Reserve. It also caused Calcasieu Refinery to cut runs to 20 percent at its refinery. Inbound traffic on the waterway was reopened July 1, 2006 (LaFavors, 2006). North America's largest operating liquefied natural gas (LNG) importation terminal, owned by BG LNG Services LLC, was also forced to close for a few days during cleanup.

In general, impacts from accidental events are not likely to last long enough to have any impacts on overall land use in the Gulf of Mexico analysis area.

Additional impacts from the 181 South Area are not anticipated because of the distance of the area from the coast (130 mi or 209 km), and oil production in the area will not be large enough to increase the overall risk of a large spill occurring in the Gulf of Mexico. However, if a spill were to occur, the higher concentration of heavy hydrocarbons could potentially cause the oil to linger in the environment longer, which may result in a slightly larger area being affected and potentially longer cleanup time.

WPA Proposed Action Analysis

The accidental events associated with a WPA proposed action that would most likely impact coastal infrastructure and land use include oil spills, chemical spills, and vessel collisions. Spills can be associated with the exploration, production, or transportation phases of a proposed action.

Both coastal or nearshore spills and vessel collisions could have short-term adverse effects on the operations of coastal infrastructure facilities. For example, on June 21, 2006, an oil spill occurred in the Calcasieu Parish Ship Channel in Lake Charles, Louisiana. The spill caused the Channel to be closed to all maritime traffic between lights 112 and 100 (World Marine News, 2006). The 11-mi (18-km) stretch of closed waterway caused a backup of vessels, six of which were carrying crude. In response to the loss of imports, Conoco Phillips and Citgo asked for oil to be lent to their refineries from the Strategic Petroleum Reserve. It also caused Calcasieu Refinery to cut runs to 20 percent at its refinery. Inbound traffic on the waterway was reopened July 1, 2006 (LaFavors, 2006). North America's largest operating LNG importation terminal, owned by BG LNG Services LLC, was also forced to close for a few days during cleanup.

In general, impacts from accidental events are not likely to last long enough to have any impacts on overall land use in the Gulf of Mexico analysis area.

Summary and Conclusion

Accidental events associated with a CPA or WPA proposed action (including the 181 South Area) 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 clean up of any oil or chemicals spilled.

4.1.16.1.4. Cumulative Impacts

Background/Introduction

A detailed description of cumulative impacts upon land use and coastal infrastructure can be found in Chapter 4.5.15.1 of the Multisale EIS. The following is a summary of the information presented, incorporating any new information that has become available since publication of the Multisale EIS, including information relevant to the addition of the 181 South Area.

The cumulative analysis considers the effects of impact-producing factors from OCS and State oil and gas activities. The OCS-related factors consist of prior, current, and future OCS lease sales. **Chapters 3.3.5.1.2 and 3.3.5.8** in the Multisale EIS discuss land use and OCS-related oil and gas infrastructure associated with the analysis area. The vast majority of this infrastructure also supports oil and gas production in State waters as well as onshore.

No recent information was found that would necessitate a reanalysis of the cumulative impacts of a proposed action upon land use and coastal infrastructure. As discussed above, MMS recently analyzed historical data and validated past scenario projections of new pipeline landfalls and new onshore waste disposal sites. Although the addition of the 181 South Area slightly increased some of the activity scenario parameters (e.g., production) for a typical CPA proposed action, the relatively small increase was not enough to change the long-term (i.e., 40-year) forecasts of coastal infrastructure needs to support OCS activity. The cumulative analysis and potential impacts detailed in the Multisale EIS apply for the new CPA area that includes the 181 South Area as well as the OCS Program. Based on the lack of significant new information and MMS's recent analyses supporting the estimates, the coastal infrastructure projections used in the Multisale EIS are still considered to be the best available.

Land use in the analysis area will evolve over time. The majority of this change is likely to occur from general regional growth rather than from activities associated with the OCS Program and/or State production. Projected new coastal infrastructure as a result of the OCS Program is shown by State in Table 4-9 of the Multisale EIS. For the OCS Program, MMS projects that up to 14 new gas processing plants with a facility size of 1.75 Bcf/d could be needed, assuming average retirement and no expansions and/or the addition of new capacity to replace what is physically depreciating over the next 40 years at all existing facilities. Of these, two are in Texas, three are in Louisiana, and nine are in the Mississippi-Alabama area. In reality, it is likely that few (if any) new, greenfield gas processing facilities would be developed along the CPA or WPA. It is much more likely that a large share of the natural gas processing capacity that is needed in the industry will be located at existing facilities, using future investments for expansions and/or to replace depreciated capital equipment for a variety of reasons. These reasons include lower development costs because of existing structures and utility services; existing interconnections to pipelines, natural gas liquid lines, and fractionators; incremental labor requirements are low relative to new facility staffing; the advantages of existing support, logistical and supply relationships such a vendors and maintenance support; and general economies of scale (Dismukes, personal communication, 2007). An example of this likely gas-processing development scenario can be seen with the Venice Gas Processing facility in Plaquemines Parish, which has expanded several times to a current maximum capacity of 1.3 Bcf/d since it was developed in 1996 as an 810 MMcf/d facility (Dismukes, personal communication, 2007).

Except for the projected new gas processing plants needed near the end of the 40-year analysis (up to 14 with a capacity of 1.75 Bcf/d, assuming average retirement and no expansions and/or the addition of new capacity to replace what is physically depreciating at all existing facilities) and the 4-6 pipeline shore facilities, the OCS Program will require no new oil and gas coastal infrastructure. There may be some expansion at current facilities, but the land in the analysis area is sufficient to handle development. The MMS expects that there is sufficient land to construct the few new gas processing plants that may be needed and the pipeline shore facilities in the analysis area. Any new facilities or expansions would also support State oil and gas production. Thus, the results of OCS and State oil and gas activities are expected to minimally alter the current land use of the area.

Shore-based OCS and State servicing should increase in the ports of Galveston, Texas; Port Fourchon, Louisiana; and Mobile, Alabama. There is sufficient land designated in commercial and industrial parks and adjacent to the Galveston and Mobile area ports to minimize disruption to current residential and business use patterns. Port Fourchon, though, has limited land available; operators have had to create land on adjacent wetland areas. Ongoing expansions at Port Fourchon began in 2001, when construction started on Phase 1 of the Northern Expansion project that would more than double the size of the port. Construction of Phase I (consisting of Slips A and B) includes 180 ac (73 ha) of non-waterfront property and 520 ac (210 ha) with 21,000 ft (6,400 m) of water frontage, and it is 75 percent complete (the remainder of the construction should be completed by 2011). Slip A is being fully utilized and 75 percent of Slip B is already under lease. The Port Commission has also begun permitting Phase 2 of the expansion and will add a Slip C, which will be 7,000 ft long by 700 ft wide (2,134 m long by 213 m wide) and will incorporate approximately 400 ac (162 ha). The Commission hopes to complete permitting by 2008 and begin the initial creation of dredging and filling activities by early 2009, with a completion date of 2014 (Schempf, 2008).

Major improvements to the South Lafourche Leonard Miller, Jr. Airport have been made to support port tenants and to attract businesses engaged in support of offshore oil and gas activities. In Phase 1, the runway was extended by 1,200 ft (365 m) (from 3,800 to 5,000 ft; 1,158 to 1,524 m) and was widened by 25 ft (8 m). Phase 2 expanded the runway another 1,500-6,500 ft (457-1,981 m). Phase 3 involved installing lighting on the extension, and Phase 4 strengthened the runway and aircraft parking apron to accommodate wheel loads up to 75,000 pounds (34,020 kilograms). Widening of the safety area and site preparation for a parallel taxiway currently is under construction and is expected to be complete in a few months time (Schempf, 2008).

In the absence of planned expansions, Louisiana Highway 1 (LA Hwy 1) would not be able to handle future OCS and State activities. A multiphase project to improve and relocate LA Hwy 1 is currently underway. Phase 1A involves the construction of a two-lane, elevated highway south of the Leeville Bridge to LA Hwy 3090 in Port Fourchon. The construction contract for this phase was signed in February 2007 and is expected to be completed and opened to traffic in the first quarter of 2011. Phases 1B and 1C involve the construction of two-lane interchanges and connector roads north and south of the Leeville Bridge and replacing the existing bridge with a two-lane, fixed-span, high-level bridge over Bayou Lafourche. Construction of these phases began in May 2006 and is expected to be completed in December 2009. Phase 1D involves the construction of the toll facility and lighting. Construction of this phase is expected to begin in the summer of 2008, and the completion will coincide with the completion of Phases 1B and 1C. Revenue collected from tolls is expected to account for over one-third of the project financing for all of Phase 1. A large portion of these tolls will be paid by transportation activities associated with OCS oil- and gas-related activities.

On April 14, 2008, Senator Mary Landrieu announced that an $8.8 million MMS grant through CIAP was secured to Louisiana for improvements to a 5-mi (8-km) stretch of LA Hwy 1. The total CIAP funding for the project is $35,161,080 ($33,000,000 from the State of Louisiana and $2,161,080 from Lafourche Parish). The State's CIAP funding will consist of $8,760,911 of FY 2007 allocations, $15,939,089 of FY 2008 allocations, and $8,300,000 of FY 2009 allocations. The Parish's CIAP funding will consist of $540,270 of FY 2007, 2008, 2009, and 2010 allocations. In addition, there are three non-CIAP funding sources for this project: $46,756,000 of Federal Formula (advanced construction) funds; $67,900,000 of Federal earmark (SAFETEA-LU) funds; and $1,500,000 from a NOAA grant.

Traffic counts on LA Hwy 1 have continued to increase with over 7,000 cars, trucks, and industrial vehicles having traveled along LA Hwy 1 during October 2007. In addition, any changes that increase OCS and State demand of water will further strain Lafourche Parish's water system. Additional OCS activity will further strain Lafourche Parish's social infrastructure as well, such as local hospitals and schools. Other ports in the analysis area that have sufficient available land plan to make infrastructure changes. Since the State of Florida and many of its residents reject any mineral extraction activities off their coastline, oil and gas businesses are not expected to be located there.

Summary and Conclusion

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. Most subareas have strong industrial bases and designated industrial parks to accommodate future growth in oil and gas businesses. No recent information was found that would necessitate a reanalysis of the cumulative impacts of a CPA or WPA proposed action upon land use and coastal infrastructure. As discussed above, MMS recently analyzed historical data and validated past scenario projections of new pipeline landfalls and new onshore waste disposal sites. Although the addition of the 181 South Area slightly increased some of the activity scenario parameters (e.g., production) for a typical CPA proposed action, the relatively small increase was not enough to change the long-term (i.e., 40-year) forecasts of coastal infrastructure needs to support OCS activity. The analysis and potential impacts detailed in the Multisale EIS apply for the new CPA area that includes the 181 South Area as well as the OCS Program. Based on the lack of significant new information and MMS's recent analyses supporting the estimates, the coastal infrastructure projections used in the Multisale EIS are still considered to be the best available.

Any changes (most likely expansions at existing facilities, except for the 4-6 new pipeline shore facilities and any new, greenfield gas processing plants) are expected to be contained on available land. Port Fourchon is expected to experience significant impacts to its land use from OCS-related expansion. Increased OCS-related usage from port clients is expected to significantly impact LA Hwy 1 in Lafourche Parish. Also, increased demand of water by the OCS will further strain Lafourche Parish's water system.

The incremental contribution of a CPA or WPA proposed action to the cumulative impacts on land use and coastal infrastructure are expected to be minor. Of the new coastal infrastructure projected as a result of the OCS Program, only 0-1 new gas processing plants and up to one new pipeline landfall are expected to be constructed as a result of a CPA or WPA proposed action, including the 181 South Area. The proposed actions would contribute to a small percentage of the projected OCS-related activity at Port Fourchon.

4.1.16.2. Demographics

The MMS has reexamined the analysis for demographics presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for demographics presented in the Multisale EIS. The 181 South Area is located nearly 130 mi (209 km) from the nearest coast and is projected to result in a relatively minor amount of additional activity, therefore no additional impacts on employment, or the resulting population and demographics, are projected as a result of the inclusion of the 181 South Area.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. A CPA or WPA proposed action is projected to minimally affect the demography of the analysis area. Population impacts from a proposed action are projected to be minimal (<1% of the total population) for any economic impact area (EIA) in the Gulf of Mexico region. The baseline population patterns and distributions, as projected and described in Chapter 3.3.5.4 of the Multisale EIS, are expected to remain unchanged as a result of a 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 (some of whom may be foreign) projected to move into focal areas, such as Port Fourchon. Accidental events associated with a 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.

The cumulative activities are projected to minimally affect the analysis area's demography. Baseline patterns and distributions of these factors, as described in Chapter 3.3.5.4.1 of the Multisale EIS, are not expected to change for the analysis area as a whole. Lafourche Parish (EIA LA-3), including Port Fourchon in particular, and Lafayette (EIA LA-2) in Louisiana are projected to experience some impacts to population as of a result of increase demand of OCS labor. A CPA or WPA proposed action is projected to have an incremental contribution of <1 percent to the population level in any of the EIA's.

4.1.16.2.1. Description of the Affected Environment

A detailed description of the demographics of the Gulf Coast can be found in Chapter 3.3.5.4 of the Multisale EIS, including the impacts of the 2005 hurricane season. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS. The 181 South Area is located at the southeastern edge of the proposed CPA sale area nearly 130 mi (209 km) from the nearest coast. Although the addition of the 181 South Area to the CPA is projected to result in some additional sale-related activity, it is not enough to impact the employment or population projections for a proposed action presented in the Multisale EIS.

Offshore waters of the WPA, CPA, and EPA lie adjacent to coastal Texas, Louisiana, Mississippi, Alabama, and Florida. The MMS grouped sets of counties and, in Louisiana, parishes into Labor Market Areas (LMA's) on the basis of intercounty commuting patterns. Twenty-three of these LMA's span the Gulf Coast and comprise the 13 MMS-defined EIA's. Table 3-17 of the Multisale EIS lists the counties and parishes that comprise the LMA's and EIA's, and **Figure 2-3** of the this SEIS illustrates the counties and parishes that comprise the EIA's. See Chapter 3.3.5.4.1 of the Multisale EIS for further detail.

Tables 3-18 through 3-30 in the Multisale EIS provide detailed demographic data. The following is a summary of that data. The area's population increased by 19 percent between 2000 and 2006. The region's 2006 total population is 23.3 million. In the U.S., population age structures typically reflect the presence of the baby-boom generation. The African-American population increased 8.2 percent between 2000 and 2006. The Hispanic population increased 24.4 percent between 2000 and 2006. This group is the second largest race/ethnic group in the region, making up 25.8 percent of the Gulf Coast population in 2006. Although Asians and Pacific Islanders constitute a relatively small proportion of the Gulf Coast population; this group has experienced a growth rate of 28.8 percent between 2000 and 2006. The proportion of white population has steadily declined and in 2006 constitutes 53.6 percent of the region's population. These overall trends vary from one Gulf Coast State to another and from one LMA to another.

Tables 3-18 through 3-30 in the Multisale EIS also contain the analysis area's baseline projections for population, employment, business patterns, and income and wealth through 2030 using Woods & Poole's *Complete Economic and Demographic Data Source* (Woods & Poole Economics, Inc., 2006). These tables present projections by MMS-defined EIA. These baseline projections assume the continuation of existing social, economic, and technological trends at the time of the forecast. Therefore, the projections include population and employment associated with the continuation of current patterns in OCS leasing activity as well as the continuation of trends in other industries important to the region. These projections include Woods & Poole's 2006 assumptions regarding Hurricane Katrina's impact on the Southeast. Over the forecast period, Woods & Poole's 2006 forecast of Hurricane Katrina's impact assumes that all of the population, employment, and income gains and losses from Hurricane Katrina will mitigate and that New Orleans, Louisiana, will fully recover (Woods & Poole Economics, Inc., 2006). These baseline projections have changed only slightly from 2006 to 2007 (Woods & Poole Economics, Inc., 2007).

Comparing the Woods & Poole projections in the 2006 data with the 2007 data for the hurricane-impacted parishes and counties (with the 2006 data in parentheses) shows that population losses from the hurricanes between 2005 and 2006 in the new data were less than those that were assumed in 2006 data and presented in the Multisale EIS: (86%) 76 percent in St. Bernard Parish, Louisiana; (66%) 51 percent in Orleans Parish, Louisiana; (51%) 22 percent in Plaquemines Parish, Louisiana; and (16%) 13 percent in Hancock, Mississippi. The 2007 data also have revised assumptions regarding counties and parishes that experienced population and employment gains because of Hurricane Katrina displacement: (21%) 5 percent in St. John the Baptist Parish, Louisiana; (10%) 5 percent in East Baton Rouge Parish, Louisiana; (18%) 4 percent in St. Charles Parish, Louisiana; and (18%) 7 percent in Tangipahoa Parish, Louisiana. In each case, these gains were less than those that were assumed in the 2006 data. **Table 4-11** presents the new baseline population estimates based on the 2007 Wood & Poole data that are used to analyze population impacts in this SEIS (an update of Table 3-35 in the Multisale EIS). In general, Woods & Poole expects the Mississippi Gulf Coast to recover its population more quickly than the heavily impacted Louisiana parishes. Although they project the Louisiana parishes to have a much slower population growth rate, they project nearly all of the communities (except for Orleans Parish) to recover completely by 2030.

The following is a summary of new information since the Multisale EIS from Rowley (2007). There is still disagreement surrounding the population estimates for the areas most affected by storms. For the City of New Orleans, the Louisiana Public Health Institute (LPHI) estimates the city's population at 191,139 as of January 2007; the U.S. Census Bureau estimates the population at 223,388 as of July 2006; and the City itself estimates it closer to 230,000. For St. Bernard Parish, the Census Bureau estimates the population at 66,441 in 2000 and 15,514 in July 2006; and the LPHI estimates it at 25,296 in January 2007. Prior to Hurricane Katrina, the population of Hancock County, Mississippi, was 46,546; as of July 2006, the Census estimated it at 40,421, indicating a substantial return of population. The Jefferson Parish population estimates are 451,049 in 2000, 431,361 in July 2006, and 434,666 in January 2007. The high population in Jefferson Parish indicates an in-migration of former residents of Orleans, St. Bernard, and Plaquemines Parishes and seasonal construction workers. See Chapter 3.3.5.5.1 of the Multisale EIS for a discussion of the relationship of population to housing availability and employment.

Recovery remains uneven throughout the affected areas. Areas where the most severe problems remain are New Orleans and St. Bernard Parish, Louisiana; and Hancock County, Mississippi. Recovery is well underway in Jefferson Parish, Lake Charles, and Cameron Parish, Louisiana; Biloxi, Gulfport, and Pascagoula, Mississippi; and Bayou La Batre, Alabama. Recovery is driving expansion in East Baton Rouge and St. Tammany Parishes, Louisiana; Jackson, Hattiesburg, and Laurel, Mississippi; and Gulf Shores and Mobile, Alabama. The measures of recovery are the functions of local government, population, crime, economic and fiscal effects, local government budgets, housing, and labor.

Age

Tables 3-18 through 3-30 of the Multisale EIS provide an overview of the Gulf Coast population, including trends and projections from 1990 to 2030. Woods & Poole projects the area to increase in population throughout this period, with a considerable shift in age structure. Until 2015, when the baby boomers start to retire in increasing numbers, the fastest growing age group will continue to be the 50- to 64-year olds. After 2015, the proportion in the 50- to 64-year age group, as well as the younger age groups, begin to decline. Meanwhile, the age structure of the region will shift toward the more elderly. For example, the 65 and older age group increases from 13.3 percent of the total population in 2006 to over 19 percent in 2030.

Tables 3-18 through 3-30 of the Multisale EIS indicate that differences in net migration and age structure among the coastal EIA's could create variations in population growth. Woods & Poole expects the highest rates of growth between 2006 and 2030 adjacent to the WPA and the lowest adjacent to the CPA. Woods & Poole projects the southern Florida and western southeastern Texas areas to have the highest growth rates, generally exceeding those expected for Louisiana, Mississippi, and Alabama, and they expect the lowest population growth rates in the Louisiana EIA's. An exception is EIA LA-4, which they expect to have the highest population growth rate (55% over this period) due to the large population loss in the New Orleans metropolitan area following Hurricane Katrina. They also expect EIA MS-1, which includes the Biloxi-Gulfport metropolitan area, to increase its population by approximately 30 percent between 2006 and 2030. This high growth rate is also largely due to the substantial population loss that occurred after Hurricane Katrina (Woods & Poole Economics, Inc., 2006). As discussed above, Woods & Poole 2007 data projections have changed only slightly (Woods & Poole Economics, Inc., 2007).

Race and Ethnic Composition

The following is a summary of the racial and ethnic composition of the analysis area presented in the Multisale EIS. The racial and ethnic composition of this area reflects both historical settlement patterns and current economic activities. In Texas from Brownsville to Corpus Christi, Hispanics form the dominant group. From Aransas to Houston, the size of the African-American population increases. In Jefferson County, Texas, adjacent to Louisiana, African-Americans outnumber Hispanics, reflecting the dominant minority status of African-Americans throughout the rest of the analysis area to the east. Despite the larger number of white, non-Hispanic people in coastal Texas, Louisiana, Mississippi, and Alabama, African-Americans and Hispanics together outnumber whites (Donato and Hakimzadeh, 2006). Approximately 45 percent of construction workers involved in the rebuilding effort and living in New Orleans, Louisiana, are estimated to be Latino (Fletcher et al., 2006). Southwestern Louisiana is Acadian country. Historically, settlers included Houma Indians, French, Spanish, English, and African. (See **Chapter 4.1.16.4**, Environmental Justice, for a further discussion of minority and low-income populations.)

4.1.16.2.2. Impacts of Routine Events

Background/Introduction

A detailed description of routine impacts on demographics associated with a CPA or WPA proposed action can be found in Chapters 4.2.2.1.15.2 and 4.2.1.1.13.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

The addition of any new human activity, such as oil and gas development resulting from the proposed actions, 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 and WPA proposed actions. The addition of the 181 South Area to a CPA sale area presents no unique issues.

CPA Proposed Action Analysis

Population

No new data or information was found that indicated that the MAG-PLAN data used in the Multisale EIS was not still valid for projecting likely future activity. Although the addition of the 181 South Area increases some activity scenario parameters (e.g., production), the net annual increases to activity are not substantial enough to affect overall employment and resulting population projections. Projected population changes reflect the number of people dependent on income from the OCS-related employment for their likelihood (e.g., family members of oil and gas workers), which is based on the ratio of population to employment in the analysis area over the life of a proposed lease sale. Thus, the population projections from the Multisale EIS are still considered to be the best available and are summarized below.

A CPA proposed action is projected to generate between 13,600 and 32,280 persons in the analysis area during the peak year of impact (year 5) for the low- and the high-case scenarios, respectively (Table 4-28 in the Multisale EIS). Using the new 2007 Woods & Poole data discussed above as the baseline, MMS recalculated the population impacts on a percentage basis. These revised numbers do not differ significantly from those presented in Table 4-29 of the Multisale EIS and mirror those for employment impacts discussed in **Chapter 4.1.16.3.2**. Population impacts from a CPA proposed action are projected to be minimal (<1% of the total population) for any EIA in the Gulf of Mexico region. The mix of males to females is expected to remain unchanged. 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 (some of whom may be foreign) projected to move into such focal areas as Port Fourchon.

Age

Given the low levels of industrial expansion and population growth projected for a CPA proposed action, the age distribution of the analysis area is projected to remain virtually unchanged through the life of a proposed action from the pattern previously discussed in Chapter 3.3.5.4.2 of the Multisale EIS. Also, a CPA proposed action is not expected to affect the analysis area's median age.

Race and Ethnic Composition

The racial distribution of the analysis area is projected to remain virtually unchanged if a CPA proposed action takes place. Given the low levels of employment and population growth and the industrial expansion projected as a result of a CPA proposed action, the racial distribution pattern described in Chapter 3.3.5.4.3 of the Multisale EIS is expected to continue through the life of a proposed action (See Chapters 3.3.5.4.1 and 3.3.5.4.3 of the Multisale EIS for a discussion of race and ethnic composition changes as a result of Hurricanes Katrina and Rita).

WPA Proposed Action Analysis

Population

No new data or information was found that indicated that the exploration and development scenarios or internal MAG-PLAN data used in the Multisale EIS was not still valid projections of likely future activity. Projected population changes reflect the number of people dependent on income from the OCS-related employment for their likelihood (e.g., family members of oil and gas workers), which is based on the ratio of population to employment in the analysis area over the life of a proposed lease sale. Thus, the employment and resulting population projections from the Multisale EIS are still considered to be the best available and are summarized below.

A WPA proposed action is expected to generate between 13,600 and 32,280 persons in the analysis area during the peak year of impact (year 2) for the low- and the high-case scenarios, respectively (Table 4-20 in the Multisale EIS). Using the new 2007 Woods & Poole data discussed above as the baseline, MMS recalculated the population impacts on a percentage basis. These revised numbers do not differ significantly from those presented in Table 4-21 of the Multisale EIS and mirror those for employment impacts discussed in **Chapter 4.1.16.3.2**. Population impacts from a WPA proposed action are projected to be minimal (<1% of the total population) for any EIA in the Gulf of Mexico region. The mix of males to females is expected to remain unchanged. 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 (some of whom may be foreign) projected to move into focal areas, such as Port Fourchon.

Age

The age distribution of the analysis area as a result of a WPA proposed action is projected to remain virtually unchanged. Given both the low levels of population growth and industrial expansion associated with a WPA proposed action, the age distribution pattern discussed in Chapter 3.3.5.4.2 of the Multisale EIS is projected to continue through the life of a proposed action. A WPA proposed action is not projected to affect the analysis area's median age.

Race and Ethnic Composition

The racial distribution of the analysis area is projected to remain virtually unchanged if a WPA proposed action takes place. Given the low levels of employment and population growth and the industrial expansion projected as the result of a WPA proposed action, the racial distribution pattern described in Chapter 3.3.5.4.3 of the Multisale EIS is expected to continue through the life of a WPA proposed action (See Chapters 3.3.5.4.1 and 3.3.5.4.3 of the Multisale EIS for a discussion of race and ethnic composition changes as a result of Hurricanes Katrina and Rita).

Summary and Conclusion

A CPA or WPA proposed action is projected to minimally affect the demography of the analysis area. Population impacts from a 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 3.3.5.4 of the Multisale EIS, are expected to remain unchanged as the result of a 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 (some of whom may be foreign) projected to move into focal areas, such as Port Fourchon.

4.1.16.2.3. Impacts of Accidental Events

Accidental events associated with a CPA or WPA proposed action such as oil or chemical spills, blowouts, and vessel collisions would have no effects on the demographic characteristics of the Gulf coastal communities.

4.1.16.2.4. Cumulative Impacts

Background/Introduction

A detailed discussion of the cumulative impacts to demographics can be found in Chapter 4.5.15.2 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

The cumulative analysis considers the effects of OCS-related, impact-producing 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, but these events cannot be predicted with reasonable accuracy. Examples of unexpected events include major future natural disasters (including but not limited to hurricanes), oil embargos, and acts of war or terrorism.

This analysis uses the economic and demographic projections from Woods & Poole (Woods & Poole Economics, Inc. 2007) to define the contributions of other likely projects, actions, and trends to the cumulative activities (see **Chapter 4.1.16.3.4** for further discussion). The analysis is for all 132 of the coastal counties and parishes in the analysis area (from Texas to Florida) over a 40-year period. Woods & Poole makes projections on local, regional, and national trend data and the assumption of a continuation of current patterns in OCS leasing activity and other industries important to the region. These projections also include Woods & Poole's assumptions regarding the impacts of, and recovery from, Hurricanes Katrina and Rita on the southeastern U.S. (Chapter 3.3.5.5 of the Multisale EIS). The same methodology used to project changes to population from routine activities associated with a CPA or WPA proposed action is used for the cumulative analysis.

Population

Population impacts from the OCS Program (Table 4-43 in the Multisale EIS) mirror those associated with employment described in **Chapter 4.1.16.3.4**. Projected population changes reflect the number of people dependent on income from oil- and gas-related employment for their livelihood (e.g., family members of oil and gas workers), a figure based on the ratio of population to employment in the analysis area. Activities associated with the OCS Program are projected to have minimal effects on population in most of the EIA's. Lafourche (EIA LA-3) and Lafayette (EIA LA-2) in Louisiana, in particular, are projected to experience noteworthy increases in population resulting from increases in demand for OCS labor. Chapter 4.5.15.3 of the Multisale EIS discusses this issue in more detail.

Using the new 2007 Woods & Poole data discussed above as the baseline, MMS recalculated the employment impacts of the OCS Program on a percentage basis. These revised numbers do not differ significantly from those presented in Table 4-44 of the Multisale EIS and mirror those discussed for OCS Program employment in **Chapter 4.1.16.3.4**.

Age

Cumulative activities are projected to leave the age distribution of the analysis area virtually unchanged. Given both the low levels of population growth and industrial expansion associated with the cumulative activities, it is projected that the age distribution pattern discussed in Chapter 3.3.3.4.2 in the Multisale EIS will likely continue throughout the 40-year analysis period.

Race and Ethnic Composition

Cumulative activities are projected to leave the racial distribution of the analysis area virtually unchanged. Given the low levels of employment and population growth and the industrial expansion projected for the cumulative activities, the racial distribution pattern described in Chapter 3.3.5.4.3 of the Multisale EIS is projected to continue throughout the 40-year analysis period. See Chapters 3.3.5.4.1 and 3.3.5.4.3 of the Multisale EIS for a discussion of race and ethnic composition changes in the New Orleans metropolitan area as a result of Hurricane Katrina.

Summary and Conclusion

The cumulative activities are projected to minimally affect the analysis area's demography. Baseline patterns and distributions of these factors, as described in Chapter 3.3.5.4.1 of the Multisale EIS, are not expected to change for the analysis area as a whole. Lafourche Parish (EIA LA-3), including Port Fourchon, in particular, and Lafayette (EIA LA-2) in Louisiana are projected to experience some impacts to population as of a result of increase demand of OCS labor. A CPA or WPA proposed action is projected to have an incremental contribution of <1 percent to the population level in any of the EIA's. Given both the low levels of population growth and industrial expansion associated with the proposed actions, it is expected the baseline age and racial distribution pattern to continue through the analysis period.

4.1.16.3. Economic Factors

The MMS has reexamined the analysis for economic factors presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. New economic and demographic data (Woods & Poole Economics, Inc., 2007) analyzed and the addition of the 181 South Area does not change the conclusions in the Multisale EIS, which stated that there would be only minor economic changes in the Texas, Louisiana, Mississippi, Alabama, and Florida EIA's should a proposed CPA or WPA lease sale occur.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. A proposed action is expected to generate less than 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 a proposed action is expected to occur in Texas and Louisiana. The demand would be met primarily with the existing population and labor force.

4.1.16.3.1. Decscription of the Affected Environment

Chapter 3.3.5.5 in the Multisale EIS describes the economic factors relevant to the socioeconomic analysis area, including current measures of employment (Chapter 3.3.5.5.1), income and wealth (Chapter 3.3.5.5.2), and business patterns by industrial sector (Chapter 3.3.5.5.3). This information is summarized below and incorporated by reference into this document. Additional supplemental information is available regarding current economic conditions in the Gulf of Mexico region, particularly as it relates the recovery to date from the 2005 hurricanes. However, this new information (summarized below) does not in any way change the baseline population and employment projections used to analyze impacts of a typical sale and the OCS Program, the methodologies used, or the conclusions presented in the Multisale EIS. The addition of the 181 South Area to the CPA sale area does not change the onshore socioeconomic analysis area used in the Multisale EIS (132 coastal counties and parishes from Texas to Florida; Table 3-17 and Figure 3-12 in the Multisale EIS).

The industrial composition for the EIA's adjacent to the CPA and those adjacent to the WPA are similar. In 2005, the top three ranking sectors in terms of employment in all EIA's in the analysis area, except FL-4, were the services, retail trade, and State and local government sectors—with the service industry ranking number one in all EIA's and retail trade ranking second in all EIA's, except FL-2, where State and local government is second. In FL-4, the top three rankings sectors were services; retail trade; and finance, insurances and real estate, in that order, with State and local government a close fourth. In EIA's TX-1, LA-1, LA-3, and FL-2, construction ranks fourth; in EIA's AL-1, MS-1, and TX-2, manufacturing ranks fourth; in EIA's LA-4, TX-3, and FL-3, finance, insurance, and real estate ranks fourth; and in EIA LA-2, mining ranks fourth.

Average annual employment growth projected from 2005 through 2030 ranges from a low of 1.22 percent for EIA LA-4 to a high of 2.50 percent for EIA FL-1 in the western panhandle of Florida. Over the same time period, employment for the U.S. is expected to grow at about 1.57 percent per year, while the Gulf of Mexico economic impact analysis area is expected to grow at about 1.73 percent per year. This represents growth in general employment for the EIA's.

In the Multisale EIS, MMS used data from Woods & Poole's *Complete Economic and Demographic Data Source* (Woods & Poole Economics, Inc., 2006) for baseline population and employment estimates over the 40-year life of a typical proposed lease sale. Table 3-41 in the Multisale EIS contains the analysis area's baseline employment projections by MMS-defined EIA. These projections are based on the Woods & Poole's *Complete Economic and Demographic Data Source* (Woods & Poole Economics, Inc., 2006) and assume the continuation of existing social, economic, and technological trends at the time of the forecast. Therefore, the projections include employment associated with the continuation of current patterns in OCS leasing activity as well as the continuation of trends in other industries important to the region. These projections also include Woods & Poole's assumptions regarding Hurricanes Katrina and Rita's impact on the Southeast.

The 2007 Woods & Poole data became available in late August 2007 and contain their revised estimates regarding the economic and demographic impacts of the 2005 hurricanes on the Gulf region (Woods & Poole Economics, Inc., 2007). In the new data, population, income, and employment were assumed to decline from 2005 to 2006 by 76 percent in St. Bernard Parish, Louisiana; 51 percent in Orleans Parish, Louisiana; 22 percent in Plaquemines Parish, Louisiana; 19 percent in Cameron Parish; Louisiana; 13 percent in Hancock County, Mississippi; and 11 percent in Harrison County, Mississippi. In each case, these losses were less than those that were assumed in the 2006 Woods & Poole data. The 2007 data also have revised assumptions regarding counties and parishes that experienced population and employment gains because of Hurricane Katrina displacement: 9 percent in Pearl River County, Mississippi; 7 percent in Tangipahoa Parish, Louisiana; 5 percent in St. John the Baptist Parish, Louisiana; 5 percent in East Baton Rouge Parish, Louisiana; and 4 percent in St. Charles Parish, Louisiana from 2005 to 2006. In each case, these gains were less than those that were assumed in the 2006 data. **Table 4-12** presents the new baseline employment estimates based on the 2007 Wood & Poole data that are used to analyze employment impacts in this document.

Two years after Hurricanes Katrina and Rita, the recovery remains uneven throughout the areas originally affected. Areas where the most severe problems remain are Orleans and St. Bernard Parishes, Louisiana, and Hancock County, Mississippi. Affordable housing continues to be a problem in these areas, particularly in New Orleans. Adding to the problem is the high cost of insurance and building materials, causing many prospective developers to postpone projects until these issues are better resolved. Recovery is well underway in Jefferson and Calcasieu Parishes, Louisiana, as well as in Biloxi, Gulfport, and Pascagoula, Mississippi; and Bayou La Batre, Alabama. Recovery is driving expansion in East Baton Rouge and St. Tammany Parishes in Louisiana; Jackson, Hattiesburg, and Laurel, Mississippi; and in Gulf Shores and Mobile, Alabama. The measures of recovery are the functions of local government, population, crime, economic and fiscal effects, local government budgets, housing, and labor (Rowley, 2007).

Researchers continue to study the employment impacts of the 2005 hurricane season. The Bureau of Labor Statistics did a special review of the employment impacts of Hurricane Katrina and found that St. Bernard, Orleans, and Jefferson Parishes had the largest percent declines in employment between September 2004 and September 2006 (38%, 27%, and 24.5%, respectively). In the two months following Hurricane Katrina, nonfarm payroll employment in Louisiana fell by 241,000, a decline of 12 percent; in the New Orleans metro area, employment declined by 215,000, or 35 percent. In the New Orleans metro area in June 2006, it was 30 percent below the level a year earlier. Total nonfarm employment in Louisiana decreased by 184,600 jobs or 9.6 percent from September 2004 to September 2005; in May 2006, the year-to-year loss was 177,700 jobs or 9.1 percent (U.S. Dept. of Labor, Bureau of Labor Statistics, 2006; pages 2, 4, 6, 8, 27, and 28). However, more recent data show nonfarm payroll employment in Louisiana increasing 3.8 percent between April 2006 and April 2007 (one of the largest over-the-year percentage gains in employment for a State), or an increase of 69,500 from 1,835,700 to 1,905,200 (U.S. Dept. of Labor, Bureau of Labor Statistics, 2007).

Estimating employment data has proven more difficult post-Hurricane Katrina, and some previous estimates are being revised as data-gathering limitations are addressed. For example, the Atlanta Federal Reserve Bank announced a revision to their employment estimates for Louisiana from 1,766,400 to 1,844,300 (an increase of 77,900 or 4.4%) between March 2005 and March 2006. Much of the revision was to account for job growth in the State's construction industry that had been underestimated due to survey sampling issues (such as identifying and sampling new construction businesses). Professional and business services is another industry where employment in Louisiana appears to have been originally underestimated (Federal Reserve Bank of Atlanta, 2006).

Researchers also continue to examine the impacts of the 2005 hurricane season on businesses in the region. For example, a Louisiana State University report on the hurricanes' effect on businesses comparing the second quarter of 2005 with the second quarter of 2006 concludes that, after a decline of over 5,000 in the number of employers (5.3%), the entire State of Louisiana had 2,270 fewer employers (2.3%) 1 year after the hurricanes (Terrell and Bilbo, 2007). The business failure rate in the year after the storms was 11.7 percent for the State as a whole compared with 26.5 percent for the five-parish Southeast region.

A new study on the economic impacts of Port Fourchon on the U.S. and Houma Metropolitan Statistical Area (MSA) was written by Loren C. Scott & Associates (2008). The report contains breakdowns of the possible economic impacts of a 3-week port shutdown due to damage from a hurricane, terrorist attack, or other destructive phenomenon to illustrate its strategic significance to other sectors of the national economy: a loss of nearly $10 billion in sales at U.S. companies; a loss of some $3 billion in U.S. household earnings; and a loss of some 77,400 jobs. The report also estimates the total impacts of port activity on the overall economy of the Houma MSA: approximately $1.5 billion in business sales; $351 million in household earnings of residents; 8,150 jobs; and at least $12 million in sales taxes collected by local governments because of the port's presence in the MSA.

4.1.16.3.2. Impacts of Routine Events

Background/Introduction

The detailed description of possible impacts on economic factors, primarily employment, from routine activities associated with a CPA or WPA proposed action is given in Chapters 4.2.2.1.15.3 and 4.2.1.1.13.3 of the Multisale EIS.

The economic analysis for a proposed lease sale in the CPA or WPA focuses on the potential direct, indirect, and induced impacts of the OCS oil and gas industry on the population and employment of the counties and parishes in the analysis region defined in Chapter 3.3.5.1 of the Multisale EIS. The MMS uses a two-stage economic impact model, called MAG-PLAN, where the first stage estimates the expenditures required to support the activity levels in a specific exploration and development scenario, and allocates these expenditures to the various industrial sectors in the onshore economic impact areas. The activities are meant to be comprehensive, including exploration drilling, platform fabrication and installation, pipeline construction and installation, and various other construction and maintenance functions required to support the phases of developments (including platform removals). High- and low-range estimates of activity drawn from this scenario form the basis for a range of estimates of employment.

The second stage of the model estimates how the initial dollars spent in a geographic area reverberate through the economy, using multipliers taken from the widely used IMPLAN model. Thus, the employment projections presented in this document represent total employment impacts (i.e., direct, indirect, and induced). Total employment projections for activities resulting from a CPA or WPA proposed action are expressed as absolute numbers and as a percentage of the baseline employment projections described above in **Chapter 4.1.16.3.1** and as shown on **Table 4-12.**

CPA Proposed Action Analysis

No new data or information was found that indicated that the MAG-PLAN data used in the Multisale EIS was not still valid for projecting likely future activity. Although the addition of the 181 South area increases some activity scenario parameters (e.g., production), the net annual increases to activity are not substantial enough to affect overall employment projections. Thus, the employment projections from the Multisale EIS are still considered to be the best available and are summarized below.

Based on MAG-PLAN model results, direct employment associated with a proposed CPA lease sale is estimated at about 3,700-9,150 jobs during the peak impact year for the low- and high-case scenarios, respectively (Tables 4-30 and 4-31 in the Multisale EIS). Indirect employment is projected at about 1,600-3,650 jobs, while induced employment is calculated to be about 2,500-5,750. Thus, total employment resulting from a proposed CPA lease sale is not expected to exceed 7,800-18,550 jobs in any given year over a proposed action's 40-year lifetime. Most of the employment related to a CPA proposed action is expected to occur in Texas (EIA TX-3) and Louisiana (EIA's LA-2, LA-3, and LA-4). It should be emphasized, however, that a portion of these estimates do not represent "new" jobs; many of these would represent new contracts or orders at existing firms that would essentially keep the firm operating at its existing level as earlier contracts and orders are completed and filled. In other words, a portion of these 7,800-18,550 jobs would be staffed with existing company labor force and would simply maintain the status quo. Thus, these employment projections are likely to overestimate the actual magnitude of new employment effect from a proposed action. Considering Florida's current opposition to oil and gas development in offshore waters and the scarcity, if not absence, of onshore supporting service bases, MMS anticipates that very few OCS-related activities will be staged from Florida.

Using the new 2007 Woods & Poole data discussed above as the baseline, MMS recalculated the employment impacts on a percentage basis. These revised numbers do not differ significantly from those presented in the Multisale EIS. Employment is not expected to exceed 1 percent of the total employment in any given EIA of Texas, Louisiana, Mississippi, Alabama, or Florida. On a percentage basis, EIA's LA-2 and LA-3 are still projected to have the greatest employment impacts at 0.5 percent. EIA LA-4 is still projected to have the next greatest impact at 0.3 percent (compared with 0.4 percent in the Multisale EIS), followed by EIA TX-3, which is still at 0.2 percent. EIA LA-1 dropped to 0.1 percent compared with 0.2 percent in the Multisale EIS.

WPA Proposed Action Analysis

No new data or information was found that indicated that the exploration and development scenarios or internal MAG-PLAN data used in the Multisale EIS was not still valid projections of likely future activity. Thus, the employment projections from the Multisale EIS are still considered to be the best available and are summarized below.

Based on MAG-PLAN model results, direct employment associated with a proposed WPA lease sale is estimated at about 1,300-2,350 jobs during the peak impact year for the low- and high-case scenarios, respectively (Tables 4-22 and 4-23 in the Multisale EIS). Indirect employment is projected at about 550-950 jobs, while induced employment is calculated to be about 850-1,500. Thus, total employment resulting from a WPA lease sale is not expected to exceed 2,700-4,800 jobs in any given year over a proposed action's 40-year lifetime. Most of the employment related to a WPA proposed action is expected to occur in Texas (EIA TX-3) and Louisiana (EIA's LA-2 and LA-3). It should be emphasized, however, that a portion of these estimates do not represent "new" jobs; many of these would represent new contracts or orders at existing firms that would essentially keep the firm operating at its existing level as earlier contracts and orders are completed and filled. In other words, a portion of these 2,700-4,800 jobs would be staffed with existing company labor force and would simply maintain the status quo. Thus, these employment projections are likely to overestimate the actual magnitude of new employment effect from the proposed action. Considering Florida's current opposition to oil and gas development in offshore waters and the scarcity, if not absence, of onshore supporting service bases, MMS anticipates that very few OCS-related activities will be staged from Florida.

Using the new 2007 Woods & Poole data discussed above as the baseline, MMS recalculated the employment impacts on a percentage basis. These revised numbers do not differ significantly from those presented in the Multisale EIS. Employment is not expected to exceed 1 percent of the total employment in any given EIA of Texas, Louisiana, Mississippi, Alabama, or Florida. On a percentage basis, EIA LA-2 is still projected to have the greatest employment impact at 0.2 percent, followed by LA-3 and TX-3, both at 0.1 percent.

Summary and Conclusion

Should a proposed CPA or WPA lease sale occur, there would be only minor economic changes in the Texas, Louisiana, Mississippi, Alabama, and Florida EIA's. A CPA or WPA proposed action is expected to generate less than a 1 percent increase in employment in any of these subareas. Most of the employment related to a proposed action is expected to occur in Texas (EIA TX-3) and Louisiana (EIA's LA-2, LA-3, and LA-4). The demand would be met primarily with the existing population and labor force for reasons discussed above.

4.1.16.3.3. Impacts of Accidental Events

Background/Introduction

A detailed description of the possible impacts from accidental events associated with a CPA or WPA proposed action on economic factors, primarily employment, is presented in Chapter 4.4.14.3 of the Multisale EIS. Accidental events associated with a CPA or WPA proposed action, such as oil or chemical spills, blowouts, and vessel collisions, will likely have minimal, if any, net effects on employment.

The immediate social and economic consequences for the region in which a spill occurs are a mix that includes not only additional opportunity cost jobs and sales but also non-market effects such as traffic congestion, strains on public services, shortages of commodities or services, and disruptions to the normal patterns of activities or expectations. These negative short-term social and economic consequences of a spill are expected to be modest as measured by projected cleanup expenditures and the number of people employed in cleanup and remediation activities. Negative long-term economic and social impacts may be more substantial if fishing, shrimping, oystering, and/or tourism were to suffer or were to be perceived as having suffered because of the spill (Pulsipher et al., 1999). **Chapters 4.4.12, 4.4.13, and 4.4.14** include additional discussions of the potential consequences of an oil spill on commercial and recreational fishing, and recreational beaches.

The employment impacts from a vessel collision or blowout are likely to be shorter term and less than those from a spill. Most blowouts last for a short duration, with half lasting less than a day.

CPA Proposed Action Analysis

Chapters 4.3.1.5, 4.3.1.6, and 4.3.4 in the Multisale EIS depict the risks and number of spills estimated to occur for a proposed action. The probabilities of an offshore oil spill ≥1,000 bbl occurring and contacting coastal counties and parishes was used as an indicator of the risk of a slick from such a spill reaching sensitive coastal environments. **Figures 3-6 and 3-7** show the Gulf of Mexico coastal counties and parishes having a risk >0.5 percent of being contacted within 10 days by an offshore oil spill ≥1,000 bbl as a result of a CPA proposed action. Most counties and parishes have a <0.5 percent probability of an oil spill ≥1,000 bbl occurring and contacting (combined probability) their shorelines within 10 days; two counties in Texas and eight parishes in Louisiana have a 1-15 percent chance of an OCS offshore oil spill ≥1,000 bbl occurring and reaching their shoreline within 10 days as the result of a proposed action over its 40-year life. In Louisiana, Plaquemines Parish has the greatest risk (10-15%) of an oil spill occurring and contacting its shoreline within 10 days as a result of a CPA proposed action. The MMS estimates that between 5 and 15 chemical spills associated with the OCS Program are anticipated each year, with a small percentage of these associated with an individual proposed action. The majority of spills are expected to be <50 bbl in size; a chemical spill of ≥1,000 bbl as a result of a proposed action or the OCS Program is very unlikely.

Net employment impacts from a spill are not expected to exceed 1 percent of baseline employment for any EIA in any given year even if they are included with employment associated with routine oil and gas development activities associated with a CPA proposed action.

The employment impacts from a vessel collision or blowout are likely to be shorter term and less than those from a spill. There are 2-3 blowouts estimated as a result of a CPA proposed action.

WPA Proposed Action Analysis

Chapters 4.3.1.5, 4.3.1.6, and 4.3.4 in the Multisale EIS depict the risks and number of spills estimated to occur for a proposed action. The probabilities of an offshore oil spill ≥1,000 bbl occurring and contacting coastal counties and parishes was used as an indicator of the risk of a slick from such a spill reaching sensitive coastal environments. **Figures 3-6 and 3-7** show the Gulf of Mexico coastal counties and parishes having a risk >0.5 percent of being contacted within 10 days by an offshore oil spill ≥1,000 bbl as a result of a WPA proposed action. Most counties and parishes have a <0.5 percent probability of an oil spill ≥1,000 bbl occurring and contacting (combined probability) their shorelines within 10 days; six counties in Texas and one parish in Louisiana have a 1-5 percent chance of an OCS offshore oil spill ≥1,000 bbl occurring and reaching their shoreline within 10 days as the result of a proposed action over its 40-year life. In Texas, Matagorda County has the greatest risk (3-5%) of being contacted within 10 days by an oil spill occurring offshore as a result of a WPA proposed action. The MMS estimates that between 5 and 15 chemical spills associated with the OCS Program are anticipated each year with a small percentage of these associated with a proposed action. The majority of spills are expected to be <50 bbl in size; a chemical spill of ≥1,000 bbl as a result of a proposed action or OCS Program is very unlikely

Net employment impacts from a spill are not expected to exceed 1 percent of baseline employment for any EIA in any given year even if they are included with employment associated with routine oil and gas development activities associated with a WPA proposed action.

The employment impacts from a vessel collision or blowout are likely to be shorter term and less than those from a spill. There are 1-2 blowouts estimated as a result of a WPA proposed action.

Summary and Conclusion

The short-term social and economic consequences for the Gulf coastal region should a spill ≥1,000 bbl occur includes opportunity cost of employment and expenditures that could have been gone to production or consumption rather than spill cleanup efforts. Non-market effects such as traffic congestion, strains on public services, shortages of commodities or services, and disruptions to the normal patterns of activities or expectations are also expected to occur in the short-term. These negative, short-term social and economic consequences of a spill are expected to be modest in terms of projected cleanup expenditures and the number of people employed in cleanup and remediation activities. Negative, long-term economic and social impacts may be more substantial if fishing, shrimping, oystering, and/or tourism were to suffer or were to be perceived as having suffered because of the spill. Net employment impacts from a spill are not expected to exceed 1 percent of baseline employment for any EIA in any given year even if they are included with employment associated with routine oil and gas development activities associated with a CPA or WPA proposed action. The employment impacts from a vessel collision or blowout are likely to be shorter-term and less than those from a spill.

4.1.16.3.4. Cumulative Impacts

Background/Introduction

A detailed discussion of the cumulative impacts to economic factors, primarily employment, can be found in Chapter 4.5.15.3 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since the publication of the Multisale EIS.

The cumulative economic analysis focuses on the potential direct, indirect, and induced employment impacts of the OCS Program's oil and gas activities in the Gulf of Mexico, together with those of other likely future projects, actions, and trends in the region. Most approaches to analyzing cumulative effects begin by assembling a list of "other likely projects and actions" that will be included with the proposed action for analysis. However, no such list of future projects and actions could be assembled that would be sufficiently current and comprehensive to support a cumulative analysis for all 132 of the coastal counties and parishes in the analysis area (from Texas to Florida) over a 40-year period. Instead of an arbitrary assemblage of future possible projects and actions, the analysis employs the economic and demographic projections from Woods & Poole Economics, Inc. (2007) to define the contributions of other likely projects, actions, and trends to the cumulative case. These projections are based on local, regional, and national trend data as well as likely changes to local, regional, and national economic and demographic conditions. Therefore, the projections include employment associated with the continuation of current patterns in OCS leasing activity as well as the continuation of trends in other industries important to the region. These Woods & Poole projections represent a more comprehensive and accurate appraisal of cumulative conditions than could be generated using the traditional list of possible projects actions. These projections also include Woods & Poole's assumptions regarding Hurricanes Katrina and Rita's impact on the Southeast (**Chapter 4.1.16.3.1**). Hence, the regional economic impact assessment methodology used to estimate changes to employment for a proposed lease sale was used for the cumulative analysis.

Tables 4-45 and 4-46 in the Multisale EIS present projected employment associated with the OCS Program. Based on these model results, direct employment in the MMS-defined EIA associated with

OCS Program activities is estimated to range between 126,000 and 160,000 jobs during peak activity years for the low and high resource estimate scenarios, respectively. Indirect employment is projected between 48,000 and 62,000 jobs, while induced employment is projected between 83,000 and 106,000 jobs for the same peak period. Therefore, total employment resulting from OCS Program activities in the MMS-defined EIA is not expected to exceed 257,000-328,000 jobs in any given year over the 40-year impact period.

Using the new 2007 Woods & Poole data discussed above as the baseline, MMS recalculated the employment impacts of the OCS Program on a percentage basis. These revised numbers do not differ significantly from those presented in the Multisale EIS.

In Texas, the majority of OCS-related employment is expected to occur in EIA TX-3, which also represents the largest projected employment level of any EIA. This employment is expected to never exceed a maximum of 2.9 percent (compared with 3.1% in the Multisale EIS) of the total employment in that EIA. The OCS-related employment for EIA's LA-2, LA-3, and LA-4 is also projected to be substantial. Direct employment levels in LA-2 and LA-3 are comparable, with LA-2 slightly higher. However, the impacts on a percentage basis are much greater in LA-2, reaching a maximum of nearly 20.3 percent (compared with 21% in the Multisale EIS) versus about 8 percent in LA-3. While these numbers are high, it is important to remember that they are overestimates because the baseline projections already include employment resulting from the continuation of current patterns in OCS Program activities. Hence, forecasting total employment from the OCS Program and then dividing by a number that already includes all of the employment from previous OCS Program actions significantly overestimates the impacts of the OCS Program on a percentage basis. Also, the percentage analysis is highly dependent on the baseline employment projections, which are somewhat dependent on the size of the EIA. The EIA LA-2 has one labor market area (Lafayette), while LA-3 has two labor market areas (Baton Rouge and Houma); it follows that the baseline employment projections for LA-2 are less than (in this case, less than half) the baseline employment projections for LA-3 and that the resulting percentage impacts in LA-2 are more than twice as high. Nonetheless, over the last decade there has been a migration to Lafayette Parish (and to a lesser extent Iberia Parish) from areas throughout coastal Louisiana, particularly in the extraction and oil and gas support sectors (Dismukes, personal communication, 2006). The next greatest impacts in percentage terms are in LA-4, LA-1, and TX-2, respectively, with none exceeding 5 percent in any given year. The OCS-related employment for TX-1 and all of Alabama, Mississippi, and Florida's EIA's is not expected to exceed 1.8 percent of the total employment in any EIA.

Employment demand will continue to be met primarily with the existing population and available labor force in most EIA's. The vast majority of these cumulative employment estimates represent existing jobs from previous OCS-Program actions. The MMS does expect some employment will be met through in-migration; however, this level is projected to be small and localized and, thus, MMS expects the sociocultural impacts from in-migration to be minimal in most EIA's. Peak annual changes in the population, labor, and employment of all EIA's resulting from the OCS Program are minimal, except in Louisiana.

On a regional level, the cumulative impact on the population, labor, and employment of the counties and parishes of the impact area is considerable for some focal points. Port Fourchon is experiencing full employment, housing shortages, and stresses on local infrastructure—roads (LA Hwy 1), water supply, schools, hospitals, etc. Port Fourchon is a focal point for OCS development, especially deepwater OCS operations. As discussed in **Chapter 4.1.16.1.2** above, Port Fourchon would most likely be the primary service base to support oil and gas activity in the 181 South Area in the near term. The proposed actions would contribute to a small percentage of the projected OCS-related activity at Port Fourchon. Any additional employment, particularly new residential employment, and the resultant strain on infrastructure, due to the OCS Program, are expected to have a significant impact on the area.

The resource costs of cleaning up an oil spill, either onshore or offshore, were not included in the above cumulative analysis. Chapter 4.3.1 in the Multisale EIS discusses the risk of spill occurrence, the number of spills estimated for the OCS Program, and the likelihood of an OCS-spill contacting the Gulf Coast. A discussion of how a spill would affect the cumulative impacts to economic factors, primarily employment, can be found in Chapter 4.5.15.3 of the Multisale EIS. Chapters 4.4.10 and 4.4.12 in the Multisale EIS contain more discussions of the consequences of a spill on fisheries and recreational beaches.

Summary and Conclusion

The OCS Program will produce only minor economic changes in the Texas, Mississippi, Alabama, and Florida EIA's. With the exception of EIA TX-3, the OCS Program is expected to represent <2 percent of employment projected in any of the EIA's in these states. Employment associated with the OCS Program reaches 2.9 percent (compared with 3.1% in the Multisale EIS) of total projected employment for EIA TX-3. However, the OCS Program is projected to substantially impact LA-2 and LA-3, with OCS-related employment expected to peak at 20.3 percent and 8.0 percent of total employment, respectively. On a regional level, activities relating to the OCS Program are expected to significantly impact employment in Lafourche Parish, Louisiana, in EIA LA-3. Therefore, the population, housing, roads (LA Hwy 1), water supply, schools, and hospitals in the parish will be affected and strained. The proposed actions would contribute to a small percentage of the projected OCS-related activity at Port Fourchon.

The short-term social and economic consequences for the Gulf coastal region should a spill ≥1,000 bbl occur includes opportunity cost of employment and expenditures that could have gone to production or consumption rather than spill-cleanup efforts. Non-market effects such as traffic congestion, strains on public services, shortages of commodities or services, and disruptions to the normal patterns of activities or expectations are also expected to occur in the short-term. These negative, short-term social and economic consequences of an oil spill are expected to be modest in terms of projected cleanup expenditures and the number of people employed in cleanup and remediation activities. Negative, long-term economic and social impacts may be more substantial if fishing, shrimping, oystering, and/or tourism were to suffer or were to be perceived as having suffered because of the spill. Overall employment projected for all oil and gas activities related to the OCS Program, including employment impacts from oil spills, is projected to be substantial (particularly in EIA's TX-3, LA-2, and LA-3).

As discussed in **Chapter 4.1.16.3.2**, a CPA or WPA proposed action is expected have an incremental contribution of <1 percent to the employment level in any of EIA's.

4.1.16.4. Environmental Justice

The MMS has reexamined the analysis for environmental justice presented in the Multisale EIS, based on the additional information presented below and the addition of the 181 South Area to the proposed CPA sale area. No significant new information was found that would alter the impact conclusion for environmental justice as presented in the Multisale EIS. The 181 South Area is located at the eastern edge of the CPA sale area nearly 130 mi (209 km) from the nearest coast. Also, the 181 South Area is projected to result in a relatively minor amount of additional sale-related activity. This limited activity will have few impacts; the location of the 181 South Area means that any impacts that may result are unlikely to be concentrated in an area that could disproportionately impact minority or low income people. Therefore, no additional impacts on minority or low-income people are projected as a result of the inclusion of the 181 South Area.

The full analyses of the potential impacts of routine activities and accidental events associated with a CPA or WPA proposed action, and a proposed action's incremental contribution to the cumulative impacts are presented in the Multisale EIS. A summary of those analyses and their reexamination due to new information and the addition of the 181 South Area is presented in the following sections. A brief summary of potential impacts follows. Because the proposed CPA sale area lies 3 or more mi (5 or more km) offshore, no activities that occur on the resulting leases (and that are regulated by MMS) will impact directly 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 proposed actions are not expected to have disproportionately high or adverse environmental or health effects on minority or low-income people. The CPA and WPA proposed actions would help to maintain ongoing levels of activity rather than expand them. The cumulative environmental justice impacts from non-OCS activities have made, and will make, substantially larger contributions to the environmental justice effects than will the OCS Program. The incremental contribution of the CPA and WPA proposed actions to cumulative impacts would be minor.

4.1.16.4.1. Description of the Affected Environment

A detailed description of environmental justice is found in Chapter 3.3.5.10 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS. It incorporates new information found since the publication of the Multisale EIS and considers the additional sale-related activity expected to be associated with 181 South Area. The 181 South Area is located at the eastern edge of the CPA sale area nearly 130 mi (209 km) from the nearest coast. Also, the 181 South Area is projected to result in a relatively minor amount of additional sale-related activity. This limited activity will have few impacts; the location of the 181 South Area means that any impacts that may result are unlikely to be concentrated in an area that could disproportionately impact minority or low-income people. Therefore, no additional impacts on minority or low-income people are projected as a result of the inclusion of the 181 South Area.

On February 11, 1994, President Clinton issued Executive Order 12898, entitled *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, which directs Federal agencies to assess whether their actions have disproportionate environmental effects on people of ethnic or racial minorities or with low incomes. Those environmental effects encompass human health, social, and economic consequences. The Federal agency in charge of the proposed action must provide opportunities for community input during the NEPA process (see **Chapter 5** for a discussion of scoping and community consultation and coordination).

The MMS manages the Nation's energy resources on the OCS. Because this area is 3 or more mi (5 or more km) offshore, well distant from human habitation, the routine activities that occur on OCS leases and that are managed by MMS do not have environmental justice impacts. For this SEIS, environmental justice concerns result indirectly from a proposed action, from nearshore and onshore activities conducted in support of offshore exploration, development and production, and these concerns result from the accidental release of petroleum (oil spills).

The nearshore and onshore activities that raise environmental justice concerns are associated with the operations of OCS-related infrastructure. During the past 60 years, State and Federal governmental agencies have leased substantial areas for petroleum development off Texas, Louisiana, Mississippi, and Alabama, and the industry has built an extensive support infrastructure system. A 2004 MMS study describes the major categories of existing OCS-related infrastructure (Louis Berger Group, Inc., 2004). Figures 3-13 through 3-15 of the Multisale EIS illustrate the distribution of the facilities identified throughout the Gulf Coast. This support-system infrastructure is described in detail in Chapter 3.3.5.8 of the Multisale EIS. This system includes "upstream" infrastructure supporting the development and production of offshore oil (e.g., shipbuilding and fabrication yards, supply ports, and pipeyards) and "downstream" infrastructure that gets the product to market (e.g., pipelines, refineries, and petrochemical plants). This environmental justice analysis emphasizes upstream infrastructure and pipelines because these operations are influenced by offshore activities (e.g., new demand for platforms); therefore, they can be affected by the OCS Program, while downstream operations such as refining are driven by consumer demand and, hence, are not affected by the OCS Program.

The OCS-related infrastructure is unevenly distributed across the Gulf of Mexico region. Table 3-40 of the Multisale EIS identifies the counties and parishes with concentrated levels of oil- and gas-related infrastructure. Much upstream infrastructure is located in coastal Louisiana and less in coastal Texas, Mississippi, and Alabama. Downstream processing is concentrated more in industrial corridors farther inland located in Texas and Louisiana and less in Mississippi and Alabama. Environmental justice maps (Figures 3-21 through 3-26 of the Multisale EIS) illustrate that the location of oil-related infrastructure does not coincide geographically with higher proportions of low-income and minority residents across Gulf of Mexico counties and parishes.

The OCS infrastructure is widespread in coastal Louisiana, but concentrated in Lafourche Parish. The majority of OCS-related infrastructure in Lafourche Parish is in the southern portion where the Houma Indian population resides. South Lafourche Parish still provides valuable habitat land for traditional subsistence activities such as hunting, fishing, and trapping practiced by the Houma and other groups in the area (Hemmerling and Colten, 2003).

Figures 3-21 through 3-23 of the Multisale EIS indicate the substantial proportions of African-American and Hispanic persons along the coast. Also, some counties and parishes have populations of Native Americans. While most of the percentages are quite small—three-quarters are 0.5 percent or less—two counties and two parishes have 2- 5 percent Native American population. The Mowa Choctaw tribe of Washington County, Alabama, constitutes 5 percent of the county's population. The United Houma Nation represents 4 percent of the population of Terrebonne Parish, Louisiana, and just over 2 percent of Lafourche Parish, Louisiana. The Alabama-Coushatta tribe is 2 percent of the population of Polk County, Texas.

Offshore workers in the production sector are almost entirely male and white (Rosenberg, personal communication, 2001). Sectors, such as the fabrication industry and support industries (e.g., trucking), employ minority workers and provide jobs across a wide range of pay levels and educational/skill requirements (Austin et al., 2002a and b; Donato et al., 1998).

Hurricane Katrina in 2005 had disproportionate impacts on the Gulf Coast population. In addition, the three states where Hurricane Katrina flooded and damaged communities rank among the poorest in the country. Approximately one-fifth (21%) of the population most directly affected by the storm was poor. Also see Chapter 3.3.5.4.1 of the Multisale EIS for further discussion of the effects of Hurricanes Katrina and Rita on minority populations.

An analysis of Federal Emergency Management Agency (FEMA) storm-damage data shows that Hurricane Katrina's impact was disproportionately borne by the region's African-American community, by people who rented their homes, and by the poor and unemployed. According to FEMA, more than one-third of the region's 1.7 million residents lived in areas that suffered flooding or moderate to catastrophic storm damage. . The majority of people living in damaged areas were in the City of New Orleans (over 350,000), with additional concentrations in suburban Jefferson Parish (175,000) and St. Bernard Parish (53,000) and along the Mississippi Coast (54,000). In the region as a whole, the disparities in storm damage are shown in the following comparisons (arranged in order of the degree of disparity): by race—damaged areas were 46 percent black, compared with 26 percent in undamaged areas; by housing tenure—46 percent of homes in damaged areas were occupied by renters, compared with 31 percent in undamaged communities; and by poverty and employment status—21 percent of households had incomes below the poverty line in damaged areas, compared with 15 percent in undamaged areas, and 7.6 percent of persons in the labor force were unemployed in damaged areas (before the storm), compared with 6.0 percent in undamaged areas. These comparisons are heavily influenced by the experience of the City of New Orleans. Outside the city, there were actually smaller shares of African-American, poor, and unemployed residents in the damaged areas. A closer inspection of neighborhoods within New Orleans shows that some affluent white neighborhoods were hard hit, while some poor minority neighborhoods were spared. Yet, if the post-Hurricane Katrina city was limited to the population previously living in areas that were undamaged by the storm—that is, if nobody were able to return to damaged neighborhoods—New Orleans is at risk of losing more than 80 percent of its black population (Logan, 2007).

Hurricane Katrina lifted and dislodged a 250,000-bbl storage tank at the Murphy Oil Refinery in St. Bernard Parish, Louisiana. The USEPA is monitoring Murphy Oil's cleanup (USEPA, 2006b). Communities such as St. Bernard Parish, Louisiana, are potentially vulnerable to such accidents because of their close proximity to OCS-related infrastructure.

The Multisale EIS states the following: "Evidence also suggests that a healthy offshore petroleum industry also indirectly benefits low-income and minority populations." One MMS study in Louisiana found income inequality decreased during the oil boom and increased with the decline (Tolbert, 1995). The following updated information relates to this point.

A follow-up study to Tolbert (1995) about Abbeville, Louisiana, resulted in the following findings. A study component of a plant closure in Abbeville found that more employment opportunities exist within the community and surrounding area because, indirectly, growth of the oil and gas industry has served as an impetus in creating other labor-market opportunities. A study component of industrial composition finds that a key source of sustainability from economic fluctuations at one time may be problematic at another time. Conversely, a problematic sector of the local economy at one time period may be proven to be a stabilizing sector at another time. These sectors include the oil and gas industry, manufacturing, and others. The particular lesson in the Abbeville context is that shifting sectors can be sustained by strong business services and professional sectors. The conclusions of Tolbert (2006) appear to qualify the conclusions of Tolbert (1995).

4.1.16.4.2. Impacts of Routine Events

Background/Introduction

A detailed description of routine impacts on environmental justice issues associated with a CPA or WPA proposed action can be found in Chapters 4.2.2.1.15.4 and 4.2.1.1.13.4 of the Multisale EIS, respectively. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

Routine impact-producing factors that raise environmental justice concerns center on increases in onshore activity and additions to the infrastructure supporting this activity. Increases in onshore activity include dimensions such as employment, migration, commuter traffic, and truck traffic. Additions to the infrastructure include possible additions to fabrication yards, supply ports, and onshore disposal sites for offshore waste. Chapter 3.3.5 of the Multisale EIS describes the widespread presence of an extensive OCS infrastructure support system and associated labor force, as well as economic factors related to OCS activities.

CPA Proposed Action Analysis

Environmental justice issues involve questions of disproportionate and negative effects on minority and low-income populations. Chapter 3.3.5.10 of the Multisale EIS provides a description of existing conditions. No predictions are made regarding employment of minority or low-income people or the location of new infrastructure. A CPA proposed action is expected to generate slight increases in employment opportunities in a wide range of businesses along the Gulf Coast.

Various economic and socioeconomic variables can affect how to assess environmental justice impacts (Singelmann, personal communication, 2006). In general, the oil and gas industry has had a slight, indirect, but positive effect on the employment of minority and low-income populations by providing local economic opportunities. It may also be, at times, a key sector of sustainability from economic fluctuations (although problematic at other time). Shifting sectors can sustain strong business services and professional sectors (Tolbert, 1995 and 2006; Tobin, 2001).

One dimension of environmental justice impact analysis is that siting of infrastructure in certain places will have disproportionate and negative effects on minority and low-income populations. A CPA proposed action will contribute to maintaining ongoing levels of activity rather than expanding them and is not expected to generate new infrastructure demand sufficient to raise siting issues.

Because of Louisiana's extensive oil-related, infrastructure support system (Chapter 3.3.5.8 of the Multisale EIS), Louisiana is likely to experience more employment effects related to a CPA proposed action than are the other coastal states. Lafourche Parish, Louisiana, is likely to experience the greatest concentration and is the only parish where the additional OCS-related activities and employment are sufficiently concentrated to increase stress to its infrastructure. Even so, the effects of a proposed action in Lafourche Parish are not anticipated to be significant in the long term or to have disproportionate effects on minority and low-income populations for two reasons. First, the parish is not predominately minority or low income (Figures 3-22 and 3-25 of the Multisale EIS). Second, while the majority of OCS-related infrastructure is located in south Lafourche Parish where the Houma Indian population is concentrated (a State of Louisiana recognized Native American tribe that is a possible environmental justice concern), the Houma Indians are not residentially segregated. A CPA proposed action would not significantly alter this preexisting situation of substantial onshore infrastructure and employment located proximate to each other. Therefore, minority and low-income populations, including the Houma Indians, are not expected to sustain disproportionate adverse effects from a CPA proposed action.

Two local infrastructure issues described in Chapter 3.3.5.2 of the Multisale EIS raise environmental justice concerns in this area—traffic on LA Hwy 1 and the Port Fourchon expansion. The most serious concern raised is the high-level of traffic on LA Hwy 1. Increased truck traffic destined for Port Fourchon physically stresses the highway, inconveniences and sometimes disrupts local communities, and may pose health risks in the form of increased accident rates and possible interference to hurricane evacuations (Keithly, 2001; Hughes et al., 2001). As described in Chapter 3.3.5.2 of the Multisale EIS, the area's "string settlement pattern" means that all income groups alike live on a narrow band of high ground along LA Hwy 1 and will be equally affected by any increased traffic. Port Fourchon is relatively new and is surrounded by mostly uninhabited land. Existing residential areas close to the port are also new and not considered low-income or minority areas. Expansion of infrastructure at Port Fourchon is not expected to affect minority or low-income populations disproportionately. Lafourche Parish is an area of relatively low unemployment because of the concentration of petroleum-related industry in the area (Hughes et al., 2001). Because of these factors, minority and low-income populations of Lafourche Parish will not experience any disproportionate impacts compared with the rest of the parish population resulting from a CPA proposed action.

The MMS has reevaluated baseline conditions pertaining to environmental justice in light of the impacts of hurricane activity in the Gulf of Mexico in 2005. While this hurricane activity affected all the residents of impacted coastal communities, in some areas it may have disproportionately impacted the size and distribution of minority and low-income populations. However, the 2005 hurricanes did not cause major shifting in the location of onshore support infrastructure nor increases in the size or concentration of minority and low-income populations associated with this infrastructure. Therefore, differences in post-2005 conditions do not change the CPA environmental justice conclusions.

WPA Proposed Action Analysis

Environmental justice issues involve questions of disproportionate and negative effects on minority and low-income populations. No predictions are made regarding employment of minority or low-income people or the location of new infrastructure. A WPA proposed action is expected to generate slight increases in employment opportunities in a wide range of businesses along the Gulf Coast.

Various economic and socioeconomic variables can affect how to assess environmental justice impacts (Singelmann, personal communication, 2006; Tolbert, 1995; and Tobin, 2001). More employment opportunities exist with a community because growth of the oil and gas industry has served as an impetus. A key sector of sustainability from economic fluctuations at one time may be problematic at another time. Shifting sectors can sustain strong business services and professional sectors (Tolbert, 2006).

One dimension of environmental justice impact analysis is that siting of infrastructure in certain places can have disproportionate and negative effects on minority and low-income populations. A WPA proposed action will contribute to maintaining ongoing levels of activity rather than expanding them and is not expected to generate new infrastructure demand sufficient to raise siting issues.

Because of Louisiana's extensive oil-related infrastructure support system (Chapter 3.3.5.8 of the Multisale EIS), Louisiana is likely to experience more employment effects related to a WPA proposed action than are the other coastal states. Lafourche Parish, Louisiana, is likely to experience the greatest concentration and is the only parish where the additional OCS-related activities and employment are sufficiently concentrated to increase stress to its infrastructure. Even so, the effects of a proposed action in Lafourche Parish are not expected to be significant in the long term or to have disproportionate effects on minority and low-income populations for two reasons. First, the parish is not predominately minority or low income (Figures 3-22 and 3-25 of the Multisale EIS). Second, while the majority of OCS-related infrastructure is located in south Lafourche where the Houma Indian population (a tribe with State of Louisiana recognition) is concentrated, the Houma Indians are not residentially segregated. Since the cumulative would not significantly alter this preexisting situation where substantial onshore infrastructure and employment already exist, minority and low-income populations including the Houma Indians would not sustain disproportionate adverse effects from a WPA proposed action.

Two local infrastructure issues described in Chapter 3.3.5.2 of the Multisale EIS raise environmental justice concerns—traffic on LA Hwy 1 and the Port Fourchon expansion. Increased truck traffic destined for Port Fourchon physically stresses the highway, inconveniences and sometimes disrupts local communities, and may pose health risks in the form of increased accident rates and possible interference to hurricane evacuations (Keithly, 2001; Hughes et al., 2001). As described in Chapter 3.3.5.2 of the Multisale EIS, the area's "string settlement pattern" means that all income groups alike live on a narrow band of high ground along LA Hwy 1 and will be equally affected by any increased traffic. Port Fourchon is relatively new and is surrounded by mostly uninhabited land. Existing residential areas close to the port are also new and not considered low-income or minority areas. Therefore, any expansion of infrastructure at Port Fourchon will not disproportionately affect minority or low-income populations. Lafourche Parish is an area of relatively low unemployment because of the concentration of petroleum-related industry in the area (Hughes et al., 2001). Minority and low-income populations of Lafourche

Parish are not expected to experience any disproportionate impacts compared with the rest of the parish population resulting from a WPA proposed action.

The baseline conditions pertaining to environmental justice were reevaluated in the light of the 2005 hurricane activity in the Gulf of Mexico. This hurricane activity had severe impacts on many coastal communities and many of these impacts fell disproportionately on minority and low-income populations. However, these changes did not cause a major shift in the distribution of the onshore infrastructure nor did they increase the number or percentage of minority and low-income populations residing near this infrastructure. Therefore, the environmental justice conclusions do not change

Summary and Conclusion

Because of the existing extensive and widespread infrastructure support system for OCS-related industry and associated labor force, the effects of a CPA or WPA proposed action are expected to be widely distributed and minimal. A proposed action is expected to generate employment that will have a limited but positive effect on low-income and minority populations. Given that existing industry infrastructure does not geographically coincide with higher proportions of minority and low-income peoples, a proposed action is not expected to have a disproportionate effect on these populations.

Lafourche Parish will experience the most concentrated effects of a proposed action. Low-income or minority groups, including the Houma Indians, are not expected to experience effects disproportionately for two reasons. First, the parish is not predominately low-income or minority. Second, while the majority of OCS-related infrastructure is located in south Lafourche where the Houma Indian population (a tribe with State of Louisiana recognition) is concentrated, the Houma Indians are not residentially segregated. Since a proposed action would not significantly alter this preexisting situation where substantial onshore infrastructure and employment already exist, minority and low-income populations including the Houma Indians would not sustain disproportionate adverse effects.

A CPA or WPA proposed action would help to maintain ongoing levels of activity rather than expand them. A proposed action is not expected to have disproportionately high or adverse environmental or health effects on minority or low-income people.

4.1.16.4.3. Impacts of Accidental Events

Background/Introduction

A detailed description of analysis of accidental impacts on environmental justice can be found in Chapter 4.4.14.4 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS, which incorporates new information found since publication of the Multisale EIS.

An environmental justice concern is the potential oil spills associated with a CPA or WPA proposed action that would enter or occur in coastal waters. Oil spills potentially could affect the many people who use those waters for fishing, diving, boating, and swimming, and they could have negative economic and health impacts.

Should an oil spill occur and contact coastal areas, any adverse effects are not likely to disproportionately impact minority or low-income populations. First, the populations immediately adjacent to the coast that might be affected are not physically, culturally, or economically homogenous. Second, these populations are not predominately minority or low income. The homes and summer homes of the relatively affluent line much of the Gulf Coast, and this process of gentrification is ongoing. As shown by Figures 3-21 through 3-26 and as discussed in Chapter 3.3.5.10 of the Multisale EIS, coastal concentrations of minority and low-income populations are few and mostly urban. The higher probabilities of oil contacting land in Louisiana are centered on South Pass and Southwest Pass at the confluence of the deltaic plain and the Gulf of Mexico (Chapter 4.3.1 of the Multisale EIS). In Louisiana, Grand Isle is the only inhabited barrier island, and this community is not predominantly minority or low income. Most of the Louisiana coast, including South Pass, Southwest Pass, and the shorelines surrounding Morgan City and the lower Mississippi Delta, is virtually uninhabited and uninhabitable.

The users of the coast and coastal waters are also not physically, culturally, or economically homogenous. Since recreational users of coastal waters tend to be relatively affluent, the impacts of an oil spill are unlikely to affect minority or low-income people disproportionately. Oil spills can have indirect effects, such as through serious, short-term impacts on tourism. However, these too are unlikely to affect minority or low-income people disproportionately. Chapter 4.4.14.4 of the Multisale EIS and **Chapter 4.1.14.3** of this SEIS discuss in further detail impacts to recreational resources from oil spills.

Approximately 61-136 coastal spills are estimated to occur within Gulf coastal waters from activities supporting CPA and WPA proposed actions, over their 40-year life, combined; most (about 90%) of these spills would be ≤1 bbl. The most likely locations of the estimated 6-15 coastal spills >1 bbl would be proximate to the major oil pipeline shore facilities. Except for two accidental 3,000-bbl spills estimated to occur in Louisiana and Texas coastal waters under the high resource-estimate scenario over the 40-year life of a proposed action, MMS estimates that coastal spills ≥1,000 bbl resulting from a proposed action have a low probability of occurrence.

Figures 3-6 and 3-7 show the Gulf of Mexico coastal counties and parishes having a risk >0.5 percent of being contacted within 10 days by an offshore spill ≥1,000 bbl occurring as a result of a proposed action. Most counties and parishes have a <0.5 percent probability of a spill ≥1,000 bbl occurring and contacting (combined probability) their shorelines within 10 days; six counties in Texas and eight parishes in Louisiana have a 1-16 percent chance of an OCS offshore spill ≥1,000 bbl occurring and reaching their shoreline within 10 days as the result of a proposed action over its 40-year life. In Louisiana, Plaquemines Parish has the greatest risk (10-16%) of a spill occurring and contacting its shoreline within 10 days as a result of a CPA proposed action. In Texas, Matagorda County has the greatest risk (3-5%) of being contacted within 10 days by a spill occurring offshore as a result of a WPA proposed action.

As explained in **Chapter 3.2.1**, the incremental increase in oil production from the addition of the 181 South Area is not expected to result in an overall increase in the numbers of oil spills ≥1,000 bbl likely to occur as a result of a CPA proposed action. Activity that would result from the addition of the 181 South Area would not cause an increase in the risk of a large spill occurring and contacting coastal counties and parishes, except for Plaquemines Parish for which the addition of the 181 South Area would result in a 1 percent increase in risk.

Summary and Conclusion

Because of the heterogeneous population distribution along the Gulf of Mexico region, accidental spill events associated with CPA and WPA proposed actions are not expected to have disproportionate adverse environmental or health effects on minority or low-income populations.

4.1.16.4.4. Cumulative Impacts

A detailed description of cumulative impacts upon environmental justice can be found in Chapter 4.5.15.4 of the Multisale EIS. The following is a summary of the information presented in the Multisale EIS unless otherwise noted.

This chapter analyzes the cumulative effects to environmental justice of the OCS Program, the CPA and WPA proposed actions, and non-OCS factors. The analysis centers on increases in onshore activity and additions to infrastructure related to this activity. Onshore activity includes activity such as employment, migration, commuter traffic, and truck traffic. Infrastructure includes such types as fabrication yards, supply ports, and onshore disposal sites for offshore waste.

Chapter 3.3.5 of the Multisale EIS describes the widespread and extensive physical infrastructure and associated labor force and the economic factors related to OCS activities. The widespread distribution of OCS-related infrastructure serves to limit the magnitude of effects that the OCS Program may have on any particular community. Additional OCS activities will serve mostly to maintain current activity levels. Generally, effects will be widely yet thinly distributed across the Gulf Coast and will consist of slightly increased employment and even more slightly increased population. For most of the Gulf Coast, cumulative activities will generate only minor changes to employment. Some places could experience elevated employment, population, infrastructure, and/or traffic effects because of local concentrations of fabrication and supply operations. Lafourche Parish, Louisiana, is one community where concentrations of industry activity and related employment are likely to continue to strain the local infrastructure.

No predictions are made regarding employment of minority or low-income people or the location of that employment. Figures 3-21 through 3-26 of the Multisale EIS provide distributions of counties and parishes of high concentrations of minority groups and low-income households. Because the distribution of low-income and minority populations does not geographically coincide with OCS-related industry infrastructure by counties and parishes, the effects of the OCS Program are not likely to be disproportionate for minority and low-income populations.

Various economic and socioeconomic variables can affect how to assess environmental impacts (Singelmann, personal communication, 2006). In general, the oil and gas industry has had a slight, indirect, but positive effect on the employment of minority and low-income populations by providing local economic opportunities. It may also be, at times, a key sector of sustainability from economic fluctuations (although problematic at other time). Shifting sectors can sustain strong business services and professional sectors (Tolbert, 1995 and 2006; Tobin, 2001).

Environmental justice often concerns infrastructure siting, which may have disproportionate and negative effects on minority and low-income populations. Since OCS lease sales help maintain, rather than expand, current levels of activity, no single sale will generate significant new infrastructure demand. Over the next 40 years, it is likely to result in new pipeline landfalls, pipeline shore facilities, and gas processing plants but, because of adequate existing capacity, it is unlikely to result in new waste-disposal sites (Louis Berger Group, Inc., 2004).

At present, there are 126 OCS-related pipeline landfalls and 50 OCS-related pipeline shore facilities in the Gulf of Mexico region (Table 3-38 of the Multisale EIS). Pipeline shore facilities are small structures, such as oil metering stations, associated with pipeline landfalls. For the 40-year analysis period, MMS predicts between 32 and 47 new pipeline landfalls and between 4 and 6 pipeline shore facilities (Table 4-9 of the Multisale EIS).

The MMS projects 14 new gas-processing plants in support of the OCS Program over the next 40 years, although their location among the states is not predicted. As described in Chapter 3.3.5.8 of the Multisale EIS, the Gulf's extensive OCS-related infrastructure is widely distributed. This distribution is based on economic and infrastructure considerations unrelated to the geographic distribution of counties and parishes with higher proportions of minority or low-income populations. Therefore, it is not likely that new coastal infrastructure resulting from the OCS Program will disproportionately affect low-income or minority groups.

Chapter 3.3.5.8 of the Multisale EIS describes Louisiana's extensive oil- and gas-related infrastructure support system. As a result of the concentration of OCS-support infrastructure, Louisiana has experienced more employment effects than the other Gulf Coast States. While the planned addition of a C-Port in Galveston, Texas, would increase Texas's share of future effects, Louisiana is likely to continue to experience more effects than do other Gulf Coast States.

Because of Louisiana's extensive oil-related infrastructure support system (Chapter 3.3.5.8 of the Multisale EIS), Louisiana is likely to experience more employment effects from cumulative activities than do other coastal states. Lafourche Parish, Louisiana, is likely to experience the greatest concentration and is the only parish where the additional OCS-related activities and employment are sufficiently concentrated to increase the existing stress to its infrastructure. Even so, these cumulative effects are unlikely to be significant in the long term or to disproportionately affect minority and low-income populations for two reasons. First, the parish is not predominately minority or low income (Figures 3-22 and 3-25 of the Multisale EIS). Second, while the majority of OCS-related infrastructure is located in south Lafourche where the Houma Indian population (a tribe with State of Louisiana recognition) is concentrated, the Houma Indians are not residentially segregated. Since the cumulative would not significantly alter this preexisting situation where substantial onshore infrastructure and employment already exist, minority and low-income populations, including the Houma Indians, would not sustain disproportionate adverse effects.

Two local infrastructure issues described in Chapter 3.3.5.2 of the Multisale EIS raise environmental justice concerns: traffic on LA Hwy 1 and the Port Fourchon expansion. The most serious concern raised during scoping for the Multisale EIS is the high level of traffic on LA Hwy 1. Increased truck traffic destined for Port Fourchon physically stresses the highway, inconveniences and sometimes disrupts local communities, and may pose health risks from increased accident rates and possible interference to hurricane evacuations (Keithly, 2001; Hughes et al., 2001). However, as described in Chapter 3.3.5.2 of the Multisale EIS, the area's "string settlement pattern" means that all income groups alike live on a narrow band of high ground along LA Hwy 1 and will be equally affected by any increased traffic.

Port Fourchon is relatively new and is mostly surrounded by uninhabited land. Existing residential areas close to the port are new and are not low income. While the minority and low-income populations of Lafourche Parish will share with the rest of the population the negative impacts of cumulative activities, most effects are expected to be economic and positive. While the link between a healthy oil industry and indirect economic benefits to all sectors of society may be weak in some communities, in Lafourche Parish it is strong. The Parish is part of an area of relatively low unemployment due to the concentration of petroleum industry activity (Hughes et al., 2001).

Chapter 4.5.15.2 discusses the potential strains on community infrastructure and services in the following parishes and counties: St. Tammany, St. John the Baptist, St. James, Ascension, St. Charles, East Baton Rouge, and Tangipahoa Parishes in Louisiana; and Stone County in Mississippi. Potential strains are found to be low; also, the distribution of low-income and minority populations does not parallel the distribution of OCS-related industry activity and infrastructure. Therefore, the infrastructure and service strains resulting from cumulative activities will not cause disproportionate and negative effects or minority and low-income groups.

As discussed in the environmental justice analysis for oil spills (Chapter 4.4.14.4 of the Multisale EIS), existing coastal populations are not generally minority or low income. Several Louisiana parishes in the lower Mississippi River Delta area have a higher percentage of minorities than the State average (e.g., Iberville, St. James, St. John the Baptist, and Orleans Parishes; Figure 3-22 of the Multisale EIS), but these are not coastal, and the majority of Louisiana's coastline is virtually uninhabited. Since none of the coastal Louisiana parishes with a high level of OCS-related infrastructure have a higher percentage of poverty than the State average (Figure 3-25 of the Multisale EIS), in the cumulative case, pipeline landfalls and their associated facilities will not disproportionately affect minority or low-income populations.

The baseline conditions pertaining to environmental justice were reevaluated in light of the 2005 hurricane activity in the Gulf of Mexico. This hurricane activity had severe impacts on many coastal communities and many of these impacts fell disproportionately on minority and low-income populations. However, these changes did not cause a major shift in the distribution of the onshore infrastructure nor did they increase the number or percentage of minority and low-income populations residing near this infrastructure. Therefore, the environmental justice conclusions of the Multisale EIS do not change.

Many studies of social change in the Gulf of Mexico coastal region suggest that the offshore petroleum industry, and even the offshore and onshore petroleum industry, has not been a critical factor except in limited in small areas for limited periods of time. This was a key conclusion of an MMS-funded study of the historical role of the industry in the Gulf, a study that addressed social issues related to environmental justice (Wallace et al., 2001). The MMS's 5-Year Programmatic EIS (USDOI, MMS, 2007a) analyzed the contribution of the OCS Program in the Gulf of Mexico to the cumulative effects. It concludes that the cumulative environmental justice impacts from non-OCS activities have made, and will make, substantially larger contributions to the environmental justice effects than will the OCS Program.

Summary and Conclusion

Because of the presence of an existing extensive and widespread infrastructure support system for OCS and associated labor force, the effects of the OCS Program are widely distributed and, except in Louisiana, likely to be minimal. In general, the OCS Program will generate employment and have a limited but positive effect on low-income and minority populations. In Louisiana, positive employment effects are expected to be greater.

While Lafourche Parish will experience the most concentrated effects of cumulative impacts, these will not disproportionately affect low-income or minority populations, including the Houma Indians. This is because the parish is not predominately low income or minority and because the effects of road traffic and port expansion will not occur in areas of low-income or minority concentration.

The OCS Program is not expected to have disproportionately high or adverse environmental or health effects on minority or low-income people. In the Gulf of Mexico coastal area, the contribution of the cumulative effects of all activities and trends affecting environmental justice issues over the next 40 years is likely to be negligible to minor. Cumulative effects will be concentrated in coastal areas and in Louisiana. The contribution of the OCS Program to cumulative impacts is expected to be minor (USDOI, MMS, 2007a). Therefore, the incremental contribution of the CPA and WPA proposed actions would also be minor.

4.2. ALTERNATIVES TO THE PROPOSED ACTIONS

4.2.1. Alternatives for Proposed Central Planning Area Sales 208, 213, 216, and 222

The following three alternatives were included for analysis in the Multisale EIS. As explained in **Chapter 2.1.3.2**, the Use of a Nomination and Tract Selection Leasing System Alternative was not included for analysis in this SEIS due to an ongoing MMS study on alternative approaches to leasing. No new alternatives were proposed due to the addition of the 181 South Area to the proposed CPA lease sales.

4.2.1.1. Alternative B—The Proposed Actions Excluding the Unleased Blocks Near Biologically Sensitive Topographic Features

Description of the Alternative

Alternative B differs from Alternative A (proposed action) by not offering blocks that are possibly affected by the proposed Topographic Features Stipulation (**Chapter 2.2.1.3.1**). All of the assumptions (including the 6 other potential mitigating measures) and estimates are the same as for a proposed action (Alternative A). A description of Alternative A is presented in **Chapter 2.2.1.1**.

No topographic features are located in the 181 South Area; therefore, no blocks located in the 181 South Area would be excluded under Alternative B.

Effects of the Alternatives

The following analyses are based on the scenario for a proposed action in the CPA (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 will happen as a result of holding a proposed sale. A detailed discussion of the scenario and related impact-producing factors is presented in **Chapter 3.1**.

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 a typical proposed action in the CPA (**Chapter 4.1**) for the following resources:

−Air Quality
−Water Quality
−Sensitive Coastal Environments
−Live Bottoms (Pinnacle Trend)
−Continental Slope and Deepwater Benthic Communities
−Marine Mammals
−Sea Turtles
−Alabama, Choctawhatchee, and Perdido Key Beach Mice
−Coastal and Marine Birds
−Gulf Sturgeon
−Fish Resources and Essential Fish Habitat
−Commercial Fishing
−Recreational Fishing
−Recreational Resources
−Archaeological Resources
−Human Resources and Land Use

The impacts to some Gulf of Mexico resources under Alternative B would be different from the impacts expected under a proposed action. These impacts are described below.

Impacts on Sensitive Offshore Resources

Topographic Features

The sources and severity of impacts associated with this alternative are those sale-related activities discussed for a proposed action. The potential impact-producing factors to the topographic features of the

Central Gulf are anchoring and structure emplacement, effluent discharge, blowouts, oil spills, and structure removal. A more detailed discussion of these potential impact-producing factors is presented in **Chapter 4.1.4.1.2.2**.

Impacts of Routine Activities and Accidental Events

Of the 16 topographic features of 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 will be eliminated by the adoption of this alternative. Effluent discharge and blowouts will 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 will 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 4.1.4.1.2.3**.

A subsurface spill would have to come into contact with a biologically sensitive feature to have an impact. A subsurface spill is expected to rise to the surface, and any oil remaining at depth will be swept clear of the banks by currents moving around the banks (Rezak et al., 1983). Deepwater subsurface spills may travel along the sea bottom or in the water column for some distance before rising to the surface. The fact that the topographic features are widely dispersed in the Central Gulf, combined with the random nature of spill events, would serve to limit the likelihood of a spill occurring proximate to a topographic feature. Chapter 4.3.1.8 of the Multisale EIS discussed the risk of spills interacting with topographic features, especially the Flower Garden Banks, in more detail. The currents that move around the banks will 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 (in the case of the Flower Garden Banks National Marine Sanctuary) (CSA, 1992b and 1994). It is anticipated that recovery from a mostly sublethal exposure would occur within a period of 2 years. In the unlikely event that oil from a subsurface spill contacted a coral-covered area (in the case of the Flower Garden Banks), 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). Indeed, the 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 Gulf of Mexico would be identical to Alternative A. The incremental contribution of a 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 Feature 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; 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. 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 (in the case of the Flower Garden Banks National Marine Sanctuary); recovery from such an event is anticipated to occur within a period of 2 years.

4.2.1.2. Alternative C—The Proposed Actions Excluding Unleased Blocks within 15 Miles of the Baldwin County, Alabama, Coast

Description of the Alternative

Alternative C differs from Alternative A (a proposed action) by not offering any unleased blocks within 15 mi (24 km) of the Baldwin County, Alabama, coast. All the assumptions (including potential mitigating measures) and estimates are the same those under Alternative A (**Chapters 2.2.1.3 and 3.1.1**). A description of Alternative A is presented in **Chapter 2.2.1.1**.

The 181 South Area is located more than 90 mi (145 km) south of the Baldwin County, Alabama, coast; therefore, no blocks located in the 181 South Area would be excluded under Alternative C.

Effects of the Alternatives

The following analyses are based on the scenario for a proposed action in the CPA (Alternative A). A detailed discussion of the scenario and related impact-producing factors is present in **Chapter 3.1**.

The analyses of impacts to the various resources under Alternative C 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 effects on the various resources. Impacts are expected to be the same as those estimated under a typical proposed action in the CPA (**Chapter 4.1**) for the following resources:

- −Air Quality
- −Sensitive Coastal Environments
- −Live Bottoms (Pinnacle Trend)
- −Topographic Features
- −Continental Slope and Deepwater Benthic Communities
- −Marine Mammals
- −Sea Turtles
- −Alabama, Choctawhatchee, and Perdido Key Beach Mice
- −Coastal and Marine Birds
- −Gulf Sturgeon
- −Fish Resources and Essential Fish Habitat
- −Commercial Fishing
- −Recreational Fishing
- −Human Resources and Land Use

Impacts to some Gulf of Mexico resources would be different from the impacts of a proposed action. These impacts are described below.

Impacts on Water Quality

Bottom-area disturbance resulting from platform emplacement and removal, drilling activities, and blowouts results in some level of increased water-column turbidity in overlying offshore waters. Generally, each of these operations has been shown to produce localized, temporary impacts on water quality conditions in the immediate vicinity of the emplacement operation (**Chapter 3.1**). Alternative C would eliminate impacts associated with platform emplacement in the areas within 15 mi off the coast of Baldwin County, Alabama.

The oil-spill events related to a proposed action under Alternative A were projected to be mostly very small events, to be very infrequent for spills greater than 50 bbl, to have effects for only a short-duration (from a few days to 3 months), and to affect only a small area of offshore waters at any one time (Chapter 4.3.1 of the Multisale EIS). These events would not be eliminated as a result of Alternative C. The risk of spills due to exploration and development would be eliminated within the deferral area.

Conclusion

Bottom disturbances from platform emplacements and removals, drilling activities, and blowouts would not occur within the excluded area under Alternative C. Localized, temporary impacts to water quality due to sediment resuspension would be eliminated in the area within 15 mi (24 km) of the Baldwin County coast, if Alternative C is adopted. Additionally, the risk of oil-spill impacts would be slightly reduced as exploration and development operations would not occur in the excluded area.

Impacts on Archaeological Resources

As a result of a typical proposed action in the CPA, Federal waters offshore Alabama were assumed to have new exploration, delineation, and development wells drilled. There would be platform installations and pipelines laid in the area. The location of any proposed activity within a lease block that has a high potential for historic shipwrecks requires archaeological clearance prior to operations. The probability of an OCS activity contacting and damaging a shipwreck is low; the required clearance measures are considered to be 90 percent effective at protecting potential unknown historic shipwrecks. If an OCS structure did contact a historic resource, unique archaeological information contained within a site or resource could be lost. Under Alternative C, drilling activities and installation of platforms within 15 mi of the shoreline of Baldwin County, Alabama, would not occur. Any potential impacts from drilling activities or platform emplacement to historic shipwrecks would be eliminated in OCS blocks within 15 mi of the Baldwin County shoreline.

Conclusion

The probability of an OCS activity contacting and damaging a shipwreck is low because of existing mitigation in the form of archaeological clearance requirements for proposed activities. Alternative C would eliminate the potential for impacts from drilling or platform emplacement to historic archaeological resources within the area excluded under Alternative C.

Impacts on Recreational Resources

The major impact-producing factors that could potentially affect recreational beaches include the presence of offshore structures, pipelaying activities, support helicopter and vessel traffic, trash and debris, and oil spills. Exploratory rig activity and platforms associated with OCS development activity could be viewed from coastal communities along the Gulf of Mexico when they are closer than approximately 10 mi (16 km) from shore; beyond that, structures appear very small and barely discernable to the naked eye, eventually disappearing from view. Alternative C would exclude those blocks within 15 mi (24 km) of the shoreline from leasing. No OCS structures would be constructed within the excluded area. Any visual impact due to OCS structures in the area off Baldwin County, Alabama, would be eliminated. Pipelaying activities, support helicopter and vessel traffic, trash and debris, and oil spills from the remaining areas offered from lease would continue to present potential impacts to recreational beaches.

Conclusion

Alternative C would exclude blocks within 15 mi (24 km) of the Baldwin County, Alabama, coast from leasing. No OCS structures would be constructed within the excluded area. Therefore, any visual impact due to OCS structures in the area off Baldwin County would be eliminated.

Cumulative Impacts

With the exception of the water quality, archaeological resources, and recreational resources, the cumulative impacts of Alternative C on the environmental and socioeconomic resources of the Gulf of Mexico would be identical to Alternative A. The incremental contribution to cumulative impacts on water quality, archaeological resources, and recreational resources within 15 mi (24 km) of the Baldwin County coast would be reduced or eliminated.

4.2.1.3. Alternative D—No Action

Description of the Alternative

Alternative D is equivalent to cancellation of a lease sale scheduled for a specific period in the *Draft Proposed Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012.* By canceling a proposed lease sale including leases that would be offered in the 181 South Area, the opportunity is postponed for development of the estimated 0.807-1.336 BBO and 3.365-5.405 Tcf of gas, some of which may be foregone. Any potential environmental and socioeconomic impacts resulting from a proposed sale (**Chapter 4.1**, Alternative A—The Proposed Actions) would be postponed or not occur.

Effects of the Alternative

Under Alternative D, USDOI cancels a planned CPA lease sale. Therefore, the discovery and development of oil and gas expected from a lease sale would be delayed and a portion may not occur. The environmental and socioeconomic effects of Alternative A (proposed action) also would be delayed or not occur.

The MMS recently published a report that examined previous exploration and development activity scenarios (USDOI, MMS, 2007g). The MMS 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 sale contributed to 2 percent of oil production and 2 percent of gas production in the CPA. In 2006, leases from 15 different sales contributed to the installation of production structures in the Gulf of Mexico, while an average CPA lease sale contributed to 6 percent of the installation of production structures in the CPA. In 2006, leases from 70 different sales contributed to wells drilled in the Gulf of Mexico, while an average CPA lease sale contributed to 4 percent of wells drilled in the CPA.

Like past lease sales, a 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 a 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 a lease sale 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, if any. Therefore, the cancellation of one lease sale would not significantly change the environmental impacts of overall OCS activity.

Economic Impacts

A sudden change in policy that restricts access to oil and gas resources, or that alters the timetables the offshore industry has come to depend on when making their investment decisions, may lead to undesirable socioeconomic disruptions in local coastal economies (USDOI, MMS, 2007g). Since 1983, MMS has scheduled and held annual areawide lease sales in the Gulf of Mexico, cancelling only one lease sale. In October 2006, MMS and the State of Louisiana reached a settlement on the lawsuit filed by the State challenging WPA Lease Sale 200. As part of this settlement, MMS canceled CPA Lease Sale 201, scheduled for March 2007. However, the acreage was offered 7 months later in CPA Lease Sale 205 (October 2007).

The cancellation of a lease sale may have economic impacts on an industry that has planned their investments according to annual lease sales in the Gulf of Mexico. Smaller independent companies would have fewer alternative projects available in their investment portfolios, and thus would be more affected by the cancellation of a sale. Therefore, they would have a more difficult time than major companies replacing lost production capacity. The magnitude and length of economic impacts on industry would be dependent on individual firm characteristics, global trends, and the number of lease sales canceled or delayed.

Canceling a lease sale would result in delaying the subsequent development activities that would take place. Revenues collected by the Federal Government (and thus revenue disbursements to the States) would be adversely affected by such a delay due to the "time value of money" (i.e., a dollar received in the future is valued less than the same dollar received today because of the opportunity to earn interest). Canceling a lease sale would delay the receipt of interest on billions of dollars of bonus bids, rental income, and royalty income by the Federal treasury.

Other Sources of Energy

Other sources of energy may substitute for the delayed or lost production. Principal substitutes would be additional imports, conservation, additional domestic production, and switching to other fuels. These alternatives, except conservation, have their own significant negative environmental and socioeconomic impacts.

Chapter 4.2.1.4 of the Multisale EIS briefly discusses the most likely alternative energy sources, the quantities expected to be needed, and the environmental and socioeconomic impacts associated with these alternative energy sources. The discussion is based on material from the following MMS publications: *Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012* (USDOI, MMS, 2007a); *Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012, Final Environmental Impact Statement* (USDOI, MMS, 2007b); and *Energy Alternatives and the Environment* (King, 2007).

Summary and Conclusion

Canceling a lease sale would eliminate the effects described for Alternative A (**Chapter 4.1**). The incremental contribution of the proposed lease sales to cumulative effects would also be foregone, but effects from other activities, including other OCS lease sales, would remain.

If a lease sale would be 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 CPA would only be reduced by a small percentage, if any. Therefore, the cancellation of one lease sale would not significantly change the environmental impacts of overall OCS activity. However, the cancellation of a 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.

4.2.2. Alternatives for Proposed Western Planning Area Sales 210, 215, and 218

The following two alternatives were included for analysis in the Multisale EIS. As explained in **Chapter 2.1.3.2** of this SEIS, the Use of a Nomination and Tract Selection Leasing System Alternative was not included for analysis in this SEIS due to an ongoing MMS study on alternative approaches to leasing.

4.2.2.1. Alternative B—The Proposed Actions Excluding the Unleased Blocks Near Biologically Sensitive Topographic Features

Description of the Alternative

Alternative B differs from Alternative A (proposed action) by not offering blocks that are possibly affected by the proposed Topographic Features Stipulation (**Chapter 2.3.1.3.1**). All of the assumptions (including the six other potential mitigating measures) and estimates are the same as for a proposed action (Alternative A). A description of Alternative A is presented in **Chapter 2.3.1.1**.

Effects of the Alternatives

The following analyses are based on the scenario for a proposed action in the WPA (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 will happen as a result of holding a proposed sale. A detailed discussion of the scenario and related impact-producing factors is presented in **Chapter 3.1**.

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 a typical proposed action in the WPA (**Chapter 4.1**) for the following resources:

−Air Quality
−Water Quality
−Sensitive Coastal Environments
−Live Bottoms (Pinnacle Trend)
−Continental Slope and Deepwater Benthic Communities
−Marine Mammals
−Sea Turtles
−Coastal and Marine Birds
−Fish Resources and Essential Fish Habitat
−Commercial Fishing
−Recreational Fishing
−Recreational Resources
−Archaeological Resources
−Human Resources and Land Use

The impacts to some Gulf of Mexico resources under Alternative B would be different from the impacts expected under a proposed action. These impacts are described below.

Impacts on Sensitive Offshore Resources

Topographic Features

The sources and severity of impacts associated with this alternative are those sale-related activities discussed for a proposed action. The potential impact-producing factors to the topographic features of the Western Gulf are anchoring and structure emplacement, effluent discharge, blowouts, oil spills, and structure removal. A more detailed discussion of these potential impact-producing factors is presented in **Chapter 4.1.4.1.2.2**.

Impacts of Routine Activities 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 will be eliminated by the adoption of this alternative. Effluent discharge and blowouts will 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 will 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 4.1.4.1.2.3**.

A subsurface spill would have to come into contact with a biologically sensitive feature to have an impact. A subsurface spill is expected to rise to the surface, and any oil remaining at depth will be swept clear of the banks by currents moving around the banks (Rezak et al., 1983). Deepwater subsurface spills may travel along the sea bottom or in the water column for some distance before rising to the surface. The fact that the topographic features are widely dispersed in the Western Gulf, combined with the random nature of spill events, would serve to limit the likelihood of a spill occurring proximate to a topographic feature. Chapter 4.3.1.8 of the Multisale EIS discussed the risk of spills interacting with topographic features, especially the Flower Garden Banks, in more detail. The currents that move around the banks will 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 (in the case of the Flower Garden Banks National Marine Sanctuary) (CSA, 1992b and 1994). It is anticipated that recovery from a mostly sublethal exposure would occur within a period of 2 years. In the unlikely event that oil from a subsurface spill contacted a coral-covered area (in the case of the Flower Garden Banks), 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). Indeed, the 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 Gulf of Mexico would be identical to Alternative A. The incremental contribution of a 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 Feature 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; 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. 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 (in the case of the Flower Garden Banks National Marine Sanctuary); recovery from such an event is anticipated to occur within a period of 2 years.

4.2.2.2. Alternative C—No Action

Description of the Alternative

Alternative C is equivalent to cancellation of a lease sale scheduled for a specific period in the *Draft Proposed Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012*. By canceling a proposed lease sale, the opportunity is postponed for development of the estimated 0.242-0.423 BBO and 1.644-2.647 Tcf of gas, some of which may be foregone. Any potential environmental and socioeconomic impacts resulting from a proposed sale (**Chapter 4.2.1**, Alternative A—The Proposed Actions) would be postponed or not occur.

Effects of the Alternative

Under Alternative C, the USDOI cancels a planned WPA lease sale. Therefore, the discovery and development of oil and gas expected from a lease sale would be delayed and a portion may not occur. The environmental and socioeconomic effects of Alternative A (proposed action) also would be delayed or not occur.

The MMS recently published a report that examined previous exploration and development activity scenarios (USDOI, MMS, 2007g). The MMS 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 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 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 sales contributed to wells drilled in the Gulf of Mexico, while an average WPA lease sale contributed to 6 percent of wells drilled in the WPA.

Like other lease sales, a 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 a proposed lease sale would replace activity resulting from existing leases that have reached or are near the end of their economic life.

Like past lease sales, a proposed WPA 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 a 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 a lease sale 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 one lease sale would not significantly change the environmental impacts of overall OCS activity.

Economic Impacts

A sudden change in policy that restricts access to oil and gas resources, or that alters the timetables the offshore industry has come to depend on when making their investment decisions, may lead to undesirable socioeconomic disruptions in local coastal economies (USDOI, MMS, 2007g). Since 1983, MMS has scheduled and held annual areawide lease sales in the Gulf of Mexico, cancelling only one lease sale. In October 2006, MMS and the State of Louisiana reached a settlement on the lawsuit filed by the State challenging WPA Lease Sale 200. As part of this settlement, MMS canceled CPA Lease Sale 201, scheduled for March 2007. However, the acreage was offered 7 months later in CPA Lease Sale 205 (October 2007).

The cancellation of a lease sale may have economic impacts on an industry that has planned their investments according to annual lease sales in the Gulf of Mexico. Smaller independent companies would have fewer alternative projects available in their investment portfolios, and thus would be more affected by the cancellation of a sale. Therefore, they would have a more difficult time than major companies replacing lost production capacity. The magnitude and length of economic impacts on industry would be dependent on individual firm characteristics, global trends, and the number of lease sales canceled or delayed.

Canceling a lease sale would result in delaying the subsequent development activities that would take place. Revenues collected by the Federal Government (and thus revenue disbursements to the States) would be adversely affected by such a delay due to the "time value of money" (i.e., a dollar received in the future is valued less than the same dollar received today because of the opportunity to earn interest). Canceling a lease sale would delay the receipt of interest on billions of dollars of bonus bids, rental income, and royalty income by the Federal treasury.

Other Sources of Energy

Other sources of energy may substitute for the delayed or lost production. Principal substitutes would be additional imports, conservation, additional domestic production, and switching to other fuels. These alternatives, except conservation, have their own significant negative environmental and socioeconomic impacts.

Chapter 4.2.1.4 of the Multisale EIS briefly discusses the most likely alternative energy sources, the quantities expected to be needed, and the environmental and socioeconomic impacts associated with these alternative energy sources. The discussion is based on material from the following MMS publications: *Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012* (USDOI, MMS, 2007a); *Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012, Final Environmental Impact Statement* (USDOI, MMS, 2007b); and *Energy Alternatives and the Environment* (King, 2007).

Summary and Conclusion

Canceling a lease sale would eliminate the effects described for Alternative A (**Chapter 4.1**). The incremental contribution of the proposed lease sales to cumulative effects would also be foregone, but effects from other activities, including other OCS lease sales, would remain.

If a lease sale would be 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 one lease sale would not significantly change the environmental impacts of overall OCS activity. However, the cancellation of a 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.

4.3. UNAVOIDABLE ADVERSE IMPACTS OF THE PROPOSED ACTIONS

Unavoidable adverse impacts associated with a proposed action are expected to be primarily short-term and localized in nature and are summarized below.

Sensitive Coastal Habitats: If an oil spill were to contact a barrier beach, the removal of beach sand during cleanup activities could result in adverse impacts if the sand is not replaced. If an oil spill contacts coastal wetlands, adverse impacts could be high in localized areas. In some areas, wetland vegetation would experience suppressed productivity for several years. Much of the wetland vegetation would recover over time, but some wetland areas would 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 maintenance dredging, wake erosion, and other secondary impacts related to channels would occur as a result of the proposed actions.

Sensitive Offshore Habitats: If an oil spill occurred and contacted sensitive offshore habitats, there could be some adverse impacts on organisms contacted by oil.

Water Quality: Routine offshore operations would cause some unavoidable effects to varying degrees on the quality of the surrounding water. Drilling, construction, and pipelaying activities would cause an increase in the turbidity of the affected waters for the duration of the activity periods. A turbidity plume would also be created by the discharge of drill cuttings and drilling fluids. This, however, would only affect water in the immediate vicinity of the rigs and platforms. The discharge of treated sewage from the rigs and platforms would increase the levels of suspended solids, nutrients, chlorine, and BOD 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.

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 impacted bodies of water through inputs of chronic 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 to air quality could occur near catastrophic events (e.g., oil spills and blowouts) due to evaporation and combustion. Mitigation of long-term effects would be accomplished through existing regulations and development of new control emission technology. However, short-term effects from nonroutine catastrophic events (accidents) are uncontrollable.

Endangered and Threatened Species: Unavoidable adverse impacts to endangered and threatened marine mammals, birds, sea turtles, mice, and the Gulf sturgeon due to activities associated with a proposed action (e.g., seismic surveys, water quality and habitat degradation, helicopter and vessel traffic, oil spills and spill response, and discarded trash and debris) would be primarily sublethal. Lethal impacts to endangered species are expected to be rare.

Nonendangered and Nonthreatened Marine Mammals: Unavoidable adverse impacts to nonendangered and nonthreatened marine mammals due to activities associated with a proposed action (e.g., seismic surveys, water quality degradation, helicopter and vessel traffic, oil spills and spill response, and discarded trash and debris) would be primarily sublethal. Lethal impacts to nonendangered and nonthreatened marine mammals are expected to be rare.

Coastal and Marine Birds: Some injury or mortality to coastal birds could result in localized areas from OCS-related oil spills, helicopter and OCS service-vessel traffic, and discarded trash and debris. Marine birds could be affected by noise, disturbances, and trash and debris associated with offshore activities. If an oil spill occurs and contacts marine or coastal bird habitats, some birds could experience sublethal impacts and birds feeding or resting in the water could be coated with oil and die. Oil spills and oil-spill cleanup activities could also affect local bird prey species.

Fish Resources and Commercial Fisheries: Losses to fishing resources and fishing gear could occur from production platform placement, oil spills, and produced-water discharges. Localized populations of fish species are expected to experience sublethal effects. This could result in a temporary decrease in a local population on a local scale. It is unlikely that fishermen would harvest fish in the area of an oil spill, as spilled oil could coat or contaminate commercial fish species rendering them unmarketable. Other unavoidable adverse impacts include loss of fishing space caused by the installation of pipelines, rigs, platforms, or by other OCS-related structures.

Recreational Beaches: Even though existing regulations prohibit littering of the marine environment with trash, offshore oil and gas operations may result in the accidental loss of some floatable debris in the ocean environment; this debris may eventually come ashore on major recreational beaches. Accidental events can lead to oil spills, which are difficult to contain in the ocean; therefore, it may be unavoidable that some recreational beaches become temporarily soiled by weathered crude oil.

Archaeological Resources: As a result of the proposed actions, unique or significant archaeological information may be lost. 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. In some cases (e.g., in areas of high sedimentation rates), survey techniques may not be effective at identifying a potential resource.

4.4. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible or irretrievable commitments of resources refer 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 loss of wetlands and associated biological resources could occur if wetlands are permanently lost due to impacts from dredging, construction activities, or oil spills. Dredging activities can result in direct and indirect loss of wetlands, and oil spills can damage or destroy wetland vegetation, which leads to increased erosion and conversion of wetlands to open water. Construction and emplacement of onshore pipelines in coastal wetlands could result in the loss of coastal wetlands because of mechanical destruction and because of landloss facilitated by erosion of the marsh soils.

Sensitive Offshore Resources: 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.

Fish Resources and Commercial Fisheries: Structure removal by explosives causes mortality to fish resources, including commercial and recreational species. Fish kills, including such valuable species as red snapper, are known to occur when explosives are used to remove structures in the Gulf of Mexico. If structure removal by explosives is continued, it will adversely impact the commercial fishing industry proximate to the removal site. However, in view of the positive impact of offshore platforms to fish resources and commercial fishing as a result of the platforms serving as artificial reefs and fish attracting devices, 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: Beached litter, debris, oil slicks, and tarballs may result in decreased enjoyment or lost opportunities for enjoyment of coastal recreational resources.

Archaeological Resources: Although the impact to archaeological resources as a result of a proposed action is expected to be low, any interaction between an impact-producing factor (drilling of wells, emplacement of platforms, subsea completions, and pipeline installation) and a significant historic shipwreck or prehistoric site could destroy information contained in the site components and in their spatial distribution. This would be an irretrievable loss of potentially unique archaeological data.

Oil and Gas Development: Leasing and subsequent development and extraction of hydrocarbons as a result of the proposed actions could represent an irreversible and irretrievable commitment of nonrenewable oil and gas resources once they are consumed. The estimated amount of resources to be recovered as a result of the proposed actions is presented in **Table 3-1**.

Loss of Human and Animal Life: The OCS oil and gas exploration, development, production, and transportation are carried out under comprehensive, state-of-the-art, enforced regulatory procedures designed to ensure public safety and environmental protection. Nonetheless, some loss of human and animal life is inevitable from unpredictable and unexpected acts of man and nature (unavoidable accidents, human error and noncompliance, and adverse weather conditions). Some normal and required operations, such as structure removal, can result in the destruction of marine life. Although the possibility exists that individual marine mammals, marine turtles, birds, and fish can be injured or killed, there is unlikely to be a lasting effect on baseline populations.

4.5. Relationship between the Short-term Use of Man's Environment and the Maintenance and Enhancement of Long-term Productivity

In this section, the short-term effects and uses of various components of the environment in the vicinity of proposed actions are related to long-term effects and the maintenance and enhancement of long-term productivity.

Short-term refers to the total duration of oil and gas exploration and production activities, whereas long-term refers to an indefinite period beyond the termination of oil and gas production. The specific impacts of a proposed action vary in kind, intensity, and duration according to the activities occurring at any given time. 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. Platform removal is also a short-term activity with localized impacts; the impacts of site clearance may be longer lasting. Over the long-term, several decades to several hundreds of years, natural environmental balances are expected to be restored.

Many of the effects discussed in **Chapter 4.1** are considered to be short-term (being greatest during the construction, exploration, and early production phases). These impacts could be further reduced by the mitigation measures discussed in **Chapter 2.**

The principle short-term use of the leased areas in the Gulf of Mexico would be for the production of 0.242-0.423 BBO and 1.644-2.647 Tcf of gas from a typical WPA proposed action and 0.807-1.336 BBO and 3.365-5.405 Tcf of gas from a typical CPA proposed action. The short-term recovery of hydrocarbons may have long-term impacts on biologically sensitive offshore areas or archaeological resources.

The OCS activities could temporarily interfere with recreation and tourism in the region, in the event of an oil spill contacting popular tourist beaches. The proposed leasing may also result in onshore development and population increases that could cause very short-term adverse impacts to local community infrastructure, particularly in areas of low population and minimal existing industrial infrastructure (**Chapter 4.1.16**, Impacts on Human Resources and Land Use). A return to equilibrium could be quickly expected as population changes and industrial development are absorbed in expanded communities. After the completion of oil and gas production, the marine environment is generally expected to remain at or return to its normal long-term productivity levels. To date, there has been no discernible decrease in long-term marine productivity in OCS areas where oil and gas have been produced for many years. The OCS development off Louisiana and Texas 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 proposed actions could increase these incidental benefits of offshore development. Offshore fishing and diving has gradually increased in the past three decades; platforms have been 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. To maintain the long-term productivity of site-specific, artificial reefs attractive to fishermen and divers, removed platforms may need to eventually be replaced.

Archaeological and historic finds discovered during development would enhance long-term knowledge. Overall, finds may help to locate other sites; but destruction of artifacts would represent long-term losses.

Extraction and consumption of offshore oil and natural gas would be a long-term depletion of nonrenewable resources. Economic, political, and social benefits would accrue from the availability of these natural resources. Most benefits would be short term and would delay the increase in the Nation's dependency on oil imports. The production of offshore oil and natural gas from the proposed action would provide short-term energy and perhaps additional time for the development of long-term alternative energy sources or substitutes for these nonrenewable resources.

CHAPTER 5

CONSULTATION AND COORDINATION

5. CONSULTATION AND COORDINATION

5.1. MULTISALE EIS

This SEIS supplements the *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* (Multisale EIS, USDOI, MMS, 2007b). The Multisale EIS addressed 11 proposed CPA and WPA lease sales, as scheduled in the proposed *Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012*. Chapter 5 of the Multisale EIS describes the consultation and coordination activities with Federal, State, and local agencies and other interested parties that occurred during the development of the Multisale EIS.

5.2. DEVELOPMENT OF THE PROPOSED ACTIONS

As mandated in the Gulf of Mexico Energy Security Act of 2006 (P.L. 109-432, December 20, 2006), MMS shall offer for oil and gas leasing approximately 4.3 million ac located in the southeastern part of the CPA (181 South Area), which would be included in proposed CPA Sales 208 (2009), 213 (2010), 216 (2011), and 222 (2012). This SEIS analyzes the potential environmental effects of oil and natural gas leasing, exploration, development, and production in the 181 South Area, and any new information available for the remainder of the proposed sales since the publication of the Multisale EIS.

5.3. NOTICE OF INTENT TO PREPARE AN SEIS AND CALL FOR INFORMATION AND NOMINATIONS

On September 10, 2007, the Call for Information and Nominations (Call) and Notice of Intent to Prepare an EIS (NOI) were published in the *Federal Register*. The general area of the Call only covers the 181 South Area. The NOI sought input on the scope of the SEIS, which covers the proposed CPA lease sales and WPA Sales 210 (2009), 215 (2010), and 218 (2011). Additional public notices were distributed via local newspapers, the U.S. Postal Service, and the Internet. A 30-day comment period was provided for the Call; it closed on October 10, 2007. A 45-day comment period was provided for the NOI; it closed on October 25, 2007. Federal, State, and local governments, along with other interested parties, were invited to send written comments to the Gulf of Mexico Region on the scope of the EIS. The MMS received several comment letters in response to the Call and/or the NOI, which are summarized below in **Chapter 5.4**.

5.4. DEVELOPMENT OF THE DRAFT SEIS

Scoping for the Draft SEIS 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 MMS an opportunity to update the Gulf of Mexico Region's environmental and socioeconomic information base. The scoping process officially commenced on September 10, 2007, with the publication of the NOI in the *Federal Register*. Formal scoping meetings were held in Texas, Louisiana, and Alabama. The dates, times, locations, and public attendance of the scoping meetings for the Draft SEIS were as follows:

Tuesday, October 9, 2007
7:00 p.m.
Larose Civic Center
307 East 5th Drive
Larose, Louisiana
13 registered attendees
11 speakers

Wednesday, October 10, 2007
1:00 p.m.
Louisiana State University
Center for Energy Studies
1077 Energy, Coast and Environment Building
Baton Rouge, Louisiana
3 registered attendees
2 speakers

Thursday, October 11, 2007
1:00 p.m.
Houston Airport Marriott
18700 J.F. Kennedy Blvd.
Houston, Texas
2 registered attendees
1 speaker

Thursday, October 11, 2007
7:00 p.m.
Riverview Plaza Hotel
64 South Water Street
Mobile, Alabama
No registered attendees or speakers

Comments (both verbal and written) were received from the Call/NOI and four scoping meetings from State and local governmental agencies; interest groups; industry; and the general public on the scope of the SEIS, significant issues that should be addressed, alternatives that should be considered, and mitigation measures. All scoping comments received, which were appropriate for a lease sale NEPA document, were considered in the preparation of this Draft SEIS. While most of the commenters were supportive of the proposed lease sales and recognized the economic benefits of the OCS Program, they requested mitigation of impacts of the OCS Program or the proposed lease sales, in particular funding of improvements to LA Hwy 1 and coastal restoration. Two letters were received opposing the proposed lease sales. Several comments were received on impact-producing factors and environmental and socioeconomic resources and issues, which were addressed in MMS's previous lease sale NEPA documents and in this Draft SEIS. Issues unique to the 181 South Area included transportation of oil production (i.e., pipelines and tankering), likely modifications of onshore facilities and onshore and nearshore pipeline networks, increased wake damage from larger vessels, increased susceptibility to hurricane impacts, longer hurricane evacuation times, and the possibility of different geological characteristics.

5.5. Distribution of the Draft SEIS for Review and Comment

The MMS sent copies of the Draft SEIS to the following public and private agencies and groups. Local libraries along the Gulf Coast were also provided copies of the document. The list of libraries and their locations is available on the MMS Internet website at http://www.gomr.mms.gov. To initiate the public review and comment period on the Draft EIS, MMS published a Notice of Availability (NOA) in the *Federal Register* on April 11, 2008. Additionally, public notices were mailed with the Draft SEIS and placed on the MMS Internet website. All comments received on the Draft SEIS were considered in the preparation of this Final SEIS.

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
- Department of the Air Force
- Department of the Army
- Corps of Engineers
- Department of the Navy

Department of Energy
- Strategic Petroleum Reserve PMD

Department of the Interior
- Fish and Wildlife Service
- Geological Survey
- Minerals Management Service
- National Park Service
- Office of Environmental Policy and Compliance
- Office of the Solicitor

Department of State
- Office of Environmental Protection
- Department of Transportation
- Coast Guard
- 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 Environmental Management
- Department of Conservation and Natural Resources
- 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
- Department of Community Affairs
- Department of Environmental Protection
- Department of State Archives, History and Records Management
- Escambia County
- Florida Coastal Zone Management Office
- State Legislature Natural Resources and Conservation Committee
- State Legislature Natural Resources Committee
- West Florida Regional Planning Council

Louisiana

- Governor's Office
- Calcasieu Regulatory Planning Commission
- Department of Culture, Recreation, and Tourism
- Department of Environmental Quality
- Department of Natural Resources
- Department of Transportation and Development
- Department of Wildlife and Fisheries
- Louisiana Geological Survey
- State Legislature Natural Resources Committee
- State House of Representatives Natural Resources Committee

Mississippi

- Governor's Office
- Department of Archives and History
- Department of Natural Resources
- Department of Wildlife Conservation
- State Legislature Oil, Gas, and Other Minerals Committee

Texas

- Governor's Office
- Attorney General of Texas
- 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 Water Development Board

Libraries

Alabama

- Auburn University Library, Montgomery
- Dauphin Island Sea Lab, Marine
- Environmental Science Consortium Library, Dauphin Island
- Gulf Shores Public Library, Gulf Shores
- Mobile Public Library, Mobile
- Montgomery Public Library, Montgomery
- Thomas B. Norton Public Library, Gulf Shores
- University of South Alabama, Mobile

Florida

- Charlotte-Glades Regional Library System, Port Charlotte
- Collier County Public Library, Naples Florida
- A&M, Coleman Memorial Library, Tallahassee
- Northwest Regional Library System, Panama City
- Florida State University, Strozier Library, Tallahassee
- Fort Walton Beach Public Library, Fort Walton Beach
- Leon County Public Library, Tallahassee
- Marathon Public Library, Marathon
- Monroe County Public Library, Key West
- Selby Public Library, Sarasota
- St. Petersburg Public Library, St. Petersburg
- Tampa-Hillsborough Public Library, Tampa
- University of Florida, Holland Law Library, Gainesville
- University of Miami Library, Miami
- University of West Florida, Pensacola

Louisiana

Calcasieu Parish Library, Lake Charles
Cameron Parish Library, Cameron
Grand Isle Branch Library, Grand Isle
Iberville Parish Library, Plaquemines
Jefferson Parish Regional Branch Library, Metairie
Jefferson Parish West Bank Outreach Branch Library, Harvey
Lafayette Public Library, Lafayette
Lafitte Branch Library, Lafitte
Lafourche Parish Library, Thibodaux
Louisiana State University Library, Baton Rouge
Louisiana Tech University Library, Ruston
Loyola University, Government Documents Library, New Orleans
LUMCON Library, Chauvin
McNeese State University, Luther E. Frazar Memorial Library, Lake Charles
New Orleans Public Library, New Orleans
Nicholls State University, Nicholls State Library, Thibodaux
Plaquemines Parish Library, Buras
St. Bernard Parish Library, Chalmette
St. Charles Parish Library, Luling
St. John the Baptist Parish Library, LaPlace
St. Mary Parish Library, Franklin
St. Tammany Parish Library, Covington
St. Tammany Parish Library, Slidell
Terrebonne Parish Library, Houma
Tulane University, Howard Tilton Memorial Library, New Orleans
University of New Orleans Library, New Orleans
University of Southwestern Louisiana, Dupre Library, Lafayette
Vermilion Parish Library, Abbeville
West Bank Regional Library, Harvey

Mississippi

Gulf Coast Research Laboratory, Gunter Library, Ocean Springs
Hancock County Library System, Bay St. Louis
Harrison County Library, Gulfport
Jackson State University, Eudora Welty Library, Jackson

Oklahoma

University of Tulsa, McFarlin Library, Tulsa

Texas

Abilene Christian University, Abilene
Alma M. Carpenter Public Library, Sourlake
Aransas Pass Public Library, Aransas Pass
Austin Public Library, Austin
Baylor University, Waco
Bay City Public Library, Bay City
Brazoria County Library, Freeport
Calhoun County Library, Port Lavaca
Chambers County Library System, Anahuac
Corpus Christi Central Library, Corpus Christi
Dallas Public Library, Dallas
East Texas State University Library, Commerce
Houston Public Library, Houston
Jackson County Library, Edna
Lamar University, Mary and John Gray Library, Lamar Station
Liberty Municipal Library, Liberty
Orange Public Library, Orange
Port Arthur Public Library, Port Arthur
Port Isabel Public Library, Port Isabel
R. J. Kleberg Public Library, Kingsville
Reber Memorial Library, Raymondville
Refugio County Public Library, Refugio
Rice University, Fondren Library, Houston
Rockwall County Library, Rockwall
Rosenberg Library, Galveston
Sam Houston Regional Library & Research Center, Liberty
Stephen F. Austin State University, Steen Library, Nacogdoches
Texas A&M University Library, Corpus Christi
Texas A&M University, Evans Library, College Station
Texas Southmost College Library, Brownsville
Texas State Library, Austin
Texas Tech University Library, Lubbock
University of Houston Library, Houston
University of Texas Library, Arlington
University of Texas Library, Austin
University of Texas Library, Brownsville
University of Texas Library, El Paso
University of Texas Library, San Antonio
University of Texas at Dallas, McDermott Library, Richardson
University of Texas, LBJ School of Public Affairs Library, Austin
University of Texas, Tarlton Law Library, Austin
Victoria Public Library, Victoria

Industry

American Petroleum Institute
Alabama Petroleum Council
Amerada Hess Corporation
Area Energy LLC
Baker Atlas
Bellwether Group
B-J Services Co
BP Amoco
C.H. Fenstermaker & Associates
Chevron U.S.A. Inc.
Clayton Williams Energy, Inc
Coastal Conservation Association
Coastal Environments, Inc.
Continental Shelf Associates, Inc.
Coscol Marine Corporation
Devon Energy Corp.
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
FNGA, FPGA and AGDF
Forest Oil Corporation
Freeport-McMoRan, Inc.
Fugro Geo Services, Inc.
General Dynamics—AIS
Geo Marine Inc.
Global Industries, Ltd.
Gulf Environmental Associates
Gulf of Mexico Newsletter
Halliburton
Horizon Marine, Inc.
Industrial Vehicles International, Inc.
International Association of Geophysical Contractors
International Paper Company
J. Connor Consultants
JK Enterprises
John Chance Land Surveys, Inc.
Kelly Energy Consultants
Kerr-McGee Corporation
Midstream Fuel Service
Mote Marine Laboratory
Newfield Exploration Company
NWF Daily News
Offshore Energy Center
Offshore Operators Committee
Petrobras America, Inc.
PPG Industries, Inc.
Propane Market Strategy Newsletter
Coffers Ocean Fishing Forecast Service
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
Triton Engineering Services Co.
W & T Offshore, Inc.
Walker Landscaping
Washington Post
WEAR-TV

Special Interest Groups

1000 Friends of Florida
American Cetacean Society
American Littoral Society
Apalachicola Riverkeeper
Audubon Louisiana Nature Center
Audubon of Florida
Audubon Society
Bay County Audubon Society
Citizens Assoc. of Bonita Beach
Clean Gulf Associates
Coalition to Restore Coastal Louisiana
Coastal Conservation Association
Conservancy of SW Florida
Defenders of Wildlife
Earthjustice
Florida Public Interest Research Group
Florida Sea Grant College
Gulf Coast Environmental Defense
Gulf Restoration Network
Hubbs-Sea World Research Institute
Izaak Walton League of America, Inc
Louisiana State University
Mobile Bay National Estuary Program
Natural Resources Defense Council
Nature Conservancy
Pacific Marine Technology
Perdido Key Association
Population Connection
Sierra Club
South Mobile Communities Association
Southeastern Fisheries Association
The Conservancy
The Conservation Fund
The Nature Conservancy
Walton County Growth Management

Ports/Docks

Alabama
- Alabama State Port Authority
- Port of Mobile

Florida
- Port Manatee
- Panama City Port Authority
- Port of Pensacola
- Tampa Port Authority

Louisiana
- Greater Baton Rouge Port Commission
- Greater Lafourche Port Commission
- Lake Charles Harbor and Terminal District
- Louisiana Offshore Oil Port, LLC
- Plaquemines Port, Harbor and Terminal District
- Port of Iberia District
- Port of New Orleans
- Port of Baton Rouge
- Port of Krotz Springs
- Port of Shreveport-Bossier
- Port of South Louisiana
- St. Bernard Port, Harbor and Terminal District

Mississippi
- Port Bienville
- Port of Biloxi
- Port of Gulfport
- Port of Natchez
- Port of Pascagoula
- Port of Vicksburg

Texas
- Brownsville Navigation District—Port of Brownsville
- Port Freeport, Texas—Brazos River Harbor Navigation District
- Port Aransas
- Port of Beaumont
- Port of Corpus Christi Authority
- Port Freeport
- Port of Galveston
- Port of Houston Authority
- Port of Isabel—San Benito Navigation District
- Port Mansfield/Willacy County Navigation District
- Port of Orange
- Port of Port Arthur Navigation District
- Port of Port Lavaca/Point Comfort
- Port of Sabine Pass
- Port of Texas City

5.6. Public Hearings

In accordance with 30 CFR 256.26, MMS held public hearings to solicit comments on the Draft SEIS. The hearings also provided the Secretary of the Interior with information from interested parties to help in the evaluation of the potential effects of the proposed lease sales. An announcement of the dates, times, and locations of the public hearings was included in the NOA for the Draft SEIS. Notices of the public hearings were also included with copies of the Draft SEIS that was mailed to the parties indicated above, were posted on the MMS Internet website (http://www.gomr.mms.gov), and were published in local newspapers (i.e., *The Houma Courier*, *The Advocate, Pensacola News*, *The Mobile Press Register*, *The Times-Picayune*, and *The Sun Herald*).

The hearings were held on the following dates and at the times and locations indicated below:

Tuesday, May 13, 2008
6:00 p.m.
Larose Civic Center
307 East 5th Drive
Larose, Louisiana
22 registered attendees
13 speakers

Wednesday, May 14, 2008
1:00 p.m.
Louisiana State University
Center for Energy Studies
1077 Energy, Coast and Environment Building
Baton Rouge, Louisiana
No registered attendees
No speakers

Thursday, May 15, 2008
6:00 p.m.
Renaissance Riverview Plaza Hotel
64 South Water Street
Mobile, Alabama
2 registered attendees
2 speakers

Attendees at the hearings included representatives from State and local governments, interest groups, industry, and the general public. All hearing comments received on the Draft SEIS were considered in the preparation of this Final SEIS. The comments presented at each of the public hearings are summarized below.

Larose, Louisiana, May 13, 2008

Thirteen speakers representing 16 parties, including State and local governments, organizations, industry, and private citizens, provided testimony at the public hearing held in Larose, Louisiana, on May 13, 2008.

Government representatives included

- Luke Theriot, representing Congressman Charlie Melancon;
- Henri Boulet, representing Senator Mary Landrieu and Senator David Vitter;
- Paula Schouest, Public Relations Coordinator for the Greater Lafourche Port Commission;
- Dirk Barrios, General Manager of the Lafourche Parish Water District;
- Perry Gisclair, Commissioner of the Greater Lafourche Port Commission; and
- Windell Curole, South Lafourche Levee District.

Organization representatives included

- Henri Boulet, Executive Director of the Louisiana Highway 1 Coalition; and
- Deanna McKneely, Executive Director of Les Reflections Du Bayou.

Local business and industry representatives included

- Paula Schouest, representing Jan Arnette, South Central Industrial Association.

Private citizens included Bob Faulk, Roland Guidry, Harold Chaisson, Buddy Cantrelle, Norris Cherie, and Jim Faulk. All speakers stressed the importance of South Louisiana to the Nation's energy supply and described the environmental and socioeconomic impacts that OCS activities have had on their community. The majority of the speakers asked for mitigation measures to address impacts to coastal infrastructure, namely LA Hwy 1, the South Lafourche levee system, and the water processing and transmission system, as well as to address coastal restoration. The majority of those speakers asked specifically for the development of a dedicated funding stream designed to mitigate the OCS-related impacts on LA Hwy 1. Henri Boulet, Executive Director of the LA-1 Coalition, reiterated his previous comment (on the Multisale EIS) that MMS place a lease stipulation on all six CPA lease sales and on any WPA leases serviced by Port Fourchon and Grand Isle. This stipulation would collect mitigation fees earmarked to fund mitigation measures for LA Hwy 1. Other impacts discussed included the increase of the cost of living, including insurance and housing costs, and the importance of the hurricane protection system. Responses to these hearing comments have been incorporated into the responses to the letters of comment in **Chapter 5.11**.

Baton Rouge, Louisiana, May 14, 2008

There were no speakers at the public hearing held in Baton Rouge, Louisiana, on May 14, 2008.

Mobile, Alabama, May 15, 2008

Two speakers spoke at the public hearing held in Mobile, Alabama, on May 15, 2008. David Underhill, Chair of the Mobile Bay Group of the Sierra Club, spoke on the following issues not being satisfactorily addressed in the Draft SEIS: (1) the nocturnal circulation of migratory birds around offshore platforms and the advantages of offshore platforms as stopover sites; and (2) alternative energy sources other than those that involve hydrocarbon combustion in the discussion of the No Action Alternative. Caroline Graves stated her concerns regarding oily beaches on Dauphin Island, LNG pipelines, and the relationship between earthquakes and "geothermal drilling."

In response to comments raised by the Sierra Club, additional information on nocturnal circulation events documented in *Interactions Between Migrating Birds and Offshore Oil and Gas Platforms in the Northern Gulf of Mexico* (Russell, 2005) has been incorporated into **Chapters 4.1.9.2 and 4.1.9.4** (Impacts on Coastal and Marine Birds).

The Sierra Club also raised concerns regarding alternative energy sources not being included in the No Action Alternative. The categories of global warming and conservation are broad topics that reflect worldwide operations. Global warming and conservation have been addressed in other MMS programmatic NEPA documents. The most recent are NEPA documents originating from MMS Headquarters; e.g., the *Outer Continental Shelf Oil and Gas Leasing Program: 2007-2012* (USDOI, MMS, 2007a) and *Energy Alternatives and the Environment* (King, 2007).

The report, *Energy Alternatives and the Environment* (King, 2007), considers alternatives to the proposed action in the *Outer Continental Shelf Oil and Gas Leasing Program 2007-2012* (5-Year Program). Chapter 4 of the report investigates the most likely response of energy markets to a No Action Alternative, or the absence of lease sales; Chapter 6 examines energy alternatives for OCS oil; and Chapter 7 examines energy alternatives for OCS natural gas. Although a variety of alternative energy technologies (including ocean currents, wave action, and tidal energy) are examined, the report concludes that, in the short-run, the mix of energy alternatives can only shift a minor degree. Most of these technologies are still only being used in pilot or small-scale projects. Although the long-run possibilities of these technologies are such that they may revolutionize the energy picture, these long-run possibilities are not likely to cause significant shifts in energy usage until most of the development associated with the present 5-Year Program has peaked out and been decommissioned.

Ms. Caroline Graves raised concerns related to oily beaches, LNG pipelines, and the relationship between earthquakes and "geothermal drilling." Without further information, the oily substances appearing on the beaches of Dauphin Island cannot be determined to be a result of OCS oil and gas activities. Large amounts of oil routinely enters the Gulf of Mexico from a variety of sources outside of OCS oil and gas activities, including State oil and gas activities, natural seeps, land-based discharge, and spills.

Regulatory processes and jurisdictional authority concerning LNG pipelines on the OCS and in coastal areas are shared by several Federal agencies, including DOI, DOT, COE, the Federal Energy Regulatory Commission (FERC), and USCG. Any proposed LNG pipelines are reviewed for potential environmental impacts, and mitigations are applied to reduce or eliminate impacts to the environment.

As for the earthquake concern that was raised, in the Gulf of Mexico oil and gas volumes are extracted from the pore spaces in sedimentary rocks. Although drilling for oil and gas resources and producing the hydrocarbon may change the subsurface pressure regime, initially dropping it when the oil or gas is extracted, it often re-equilibrates later when water or brine moves into the pore space previously occupied by the oil or gas. When this does not occur or only partially occurs, since the rock itself is slightly elastic, there may be some settlement and compaction of the rock, resulting in a change in stress. However, this change in stress is very minimal compared with stress changes caused by the large numbers of naturally occurring active geologic faults that exist in the Gulf of Mexico. Geologic faults have a far greater effect on stress patterns, and movement along these faults is known to cause numerous minor earthquakes in the Gulf. Fortunately, most of these quakes are of "nuisance value" at worse. Big earthquakes are on a different scale. These big earthquakes originate deep in the earth's crust and mantle, are up to hundreds of kilometers down, and are not affected or are the result of oil and gas drilling or production activities. There is no indication that drilling or production activity in the Gulf of Mexico could cause or have a measurable effect on big earthquakes.

Geothermal energy facilities use thermal energy within the earth, using hot water and steam to produce electricity or supply heat. According to the Energy Information Administration, geothermal energy has limited geographic availability, with most suitable sites found in the western United States (U.S. Dept. of Energy, EIA, 2008). At present, no geothermal energy projects are proposed on the OCS.

5.7. COASTAL ZONE MANAGEMENT ACT

A consistency review will be performed and a CD will be prepared for each affected State prior to each proposed lease sale. To prepare the CD's, MMS reviews each State's CZMP and analyzes the potential impacts as outlined in this SEIS, new information, and applicable studies as they pertain to the enforceable policies of each CZMP. Based on the analyses, the MMS Director makes an assessment of consistency, which is then sent to each State with the PNOS. If a State disagrees with MMS's CD, the State is required to do the following under the CZMA: (1) indicate how the MMS presale proposal is inconsistent with their CZMP and suggest alternative measures to bring the MMS proposal into consistency with their CZMP 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 presale activities. Either MMS or the State may request mediation. Mediation is voluntary, and the DOC 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 presale consistency process. Each Gulf State's CZMP is described in Appendix B of the Multisale EIS (USDOI, MMS, 2007b).

5.8. ENDANGERED SPECIES ACT

The Endangered Species Act (ESA) of 1973 (16 U.S.C. 1531 *et seq*.) of 1973, 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. In accordance with Section 7 of the ESA, MMS consults with NMFS and FWS on possible and potential impacts from sale proposals on endangered/threatened species and designated critical habitat under their jurisdiction. The MMS has consulted NMFS and FWS on the proposed lease sales and associated activities in the Gulf of Mexico in the 2007-2012 5-Year Program.

The NMFS Biological Opinion was signed on June 29, 2007, and was received by MMS on July 3, 2007. The Biological Opinion concludes that the proposed lease sales and associated activities in the Gulf of Mexico in the 2007-2012 OCS Leasing Program, including the lease sales addressed in this SEIS, are not likely to jeopardize the continued existence of threatened and endangered species under NMFS jurisdiction, or destroy or adversely modify designated critical habitat. The NMFS issued an Incidental Take Statement on sea turtle species, which contains reasonable and prudent measures with implementing terms and conditions to help minimize take.

The FWS and MMS have consulted informally per FWS guidance. A draft copy of the Biological Assessment, prepared by MMS, was submitted as requested by FWS (USDOI, MMS, 2007h). On June 28, 2007, MMS received oral confirmation from FWS that the consultation will remain informal; therefore, there will be no new mitigations or Terms and Conditions from FWS. The final Biological Assessment and a request for a Letter of Concurrence were submitted to FWS on August 3, 2007. The FWS submitted a Letter of Concurrence dated September 14, 2007 (USDOI, FWS, 2007a). The FWS concurred with the MMS determination that proposed actions of the 2007-2012 OCS Leasing Program were not likely to adversely affect the threatened/endangered species or designated critical habitat under FWS jurisdiction. Sea turtles are under FWS jurisdiction when on a nesting beach.

The biological assessments prepared by MMS analyzed a typical year of OCS activity rather than a typical lease sale and did not exclude the 181 South Area. Therefore, concurrence letters will be requested annually from NMFS and FWS to determine whether or not the information and analyses in the biological assessments and the associated consultations under the ESA are still valid. Additionally, MMS has received concurrence from NMFS and FWS that the additional potential impacts analyzed for Lease Sale 208 and beyond do not alter the findings of the previous consultations and therefore do not trigger a reinitiation of consultation under the ESA. The concurrence requests from MMS were dated June 16, 2008, with written concurrence submitted from NMFS on July 24, 2008 and FWS on July 30, 2008.

5.9. 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 essential fish habitat (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 MMS may result in adverse effects to EFH, and therefore, require EFH consultation.

In March 2000, the MMS's Gulf of Mexico Region consulted with NMFS's Southeast Regional Office in preparing a NMFS regional finding for the Gulf of Mexico Region that allows MMS to incorporate the EFH assessments into NEPA documents. The MMS consulted on a programmatic level, by letters of July 1999 and August 1999, to address EFH issues for certain MMS OCS activities (plans of exploration and production, pipeline rights-of-way, and platform removals).

An EFH consultation for the CPA and WPA lease sales included in the 2002-2007 OCS Leasing Program, using the Draft Multisale EIS as the NEPA document, was initiated in March 2002 by MMS with NMFS's Southeast Regional Office. The NMFS responded in April 2002, endorsing the implementation of resource protection measures previously developed cooperatively by MMS and NMFS in 1999 to minimize and avoid EFH impacts related to exploration and development activities in the CPA and WPA. In addition to routine measures, additional conservation recommendations were made. In May 2002, MMS responded to NMFS acknowledging receipt and agreement to follow the additional conservation recommendations. The EFH conservation measures recommended by NMFS serve the purpose of protecting EFH. Continuing agreements, including avoidance distances from topographic-feature's No Activity Zones and live-bottom pinnacle features, and circumstances that require project-specific consultation, appear in NTL 2004-G05.

Effective January 23, 2006, NMFS approved a revision to the EFH rules acknowledging amendments made by the Gulf of Mexico Fishery Management Council that included the identification of habitat areas of particular concern. One of the most important changes noted in the amendment is the elimination of the EFH description and identification from waters between 100 fathoms and the seaward limit of the EEZ.

Further programmatic consultation was initiated and completed for the 2007-2012 lease sales addressed in the Multisale EIS, which did not include the 181 South Area. The NMFS concurred by letter dated December 12, 2006, that the information presented in the Draft Multisale EIS satisfies the EFH consultation procedures outlined in 50 CFR 600.920 and as specified in our March 17, 2000, findings. Provided MMS proposed mitigations, our previous EFH conservation recommendations, and the standard lease stipulations and regulations are followed as proposed, NMFS agrees that impacts to EFH and associated fishery resources resulting from activities conducted under the 2007-2012 lease sales would be minimal. Due to the addition of the 181 South Area, a new request for EFH consultation and a revision of the Programmatic Consultation was initiated with the completion of the Draft SEIS and a letter dated April 21, 2008. A response from NMFS was received on April 28, 2008, concurring that impacts to EFH and associated fishery resources resulting from activities in the 181 South Area should be minimal. The NMFS also agreed that the programmatic consultation agreement would incorporate activities within the 181 South Area and that MMS agrees to apply all previously accepted EFH conversation recommendations and all standard lease stipulations and regulations to the new 181 South Area.

5.10. Major Differences Between the Draft and Final SEIS's

Comments on the proposed CPA Lease Sale 208 and the Draft SEIS were received during the public hearings and were received via written and electronic correspondence. As a result of these comments, changes have been made between the Draft and Final SEIS's. The text has been revised or expanded to provide clarification on specific issues. The text revisions include alternatives to areawide leasing, heavier oil projections (API gravity), new rules regarding practices for the protection from damages to offshore infrastructure as a result of hurricanes, new NTL's, new incidental take regulations for explosive severance activities, updates of proposed alternative energy projects, new ozone standards, new landloss rates, nocturnal circulation of migratory birds, expansion of Port Fourchon and the Leonard Miller Airport, and results of a recent study of the economic impacts of Port Fourchon on the U.S. and Houma.

5.11. Letters of Comment on the Draft SEIS and MMS's Responses

The NOA and announcement of public hearings were published in the *Federal Register* on April 11, 2008, were posted on the MMS Internet website, and were mailed to interested parties. Distribution of the Draft SEIS began on April 11, 2008, and the comment period ended on June 10, 2008. Thirteen comment letters were received from the following:

Federal Agencies

U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service

State Agencies and Representatives

Alabama Department of Environmental Management
Alabama Historical Commission
Florida Department of State
Sarasota County Commission
State of Louisiana, Office of the Governor

Organizations and Associations

Bayou Industrial Group
Chamber of Lafourche and the Bayou Region
Earth Justice
Restore or Retreat

General Public

Jim Faulk
Viola Goldberg

Copies of these letters are presented on the subsequent pages. Each letter's comments have been marked for identification purposes. The MMS's responses immediately follow each letter.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

MAY 28 2008

Dennis Chew
U.S. Department of the Interior
Minerals Management Service
Gulf of Mexico OCS Region
MS 5410
1201 Elm Park Boulevard
New Orleans, LA 70123-2394

Dear Mr. Chew:

In accordance with our responsibilities under Section 309 of the Clean Air Act (CAA), the National Environmental Policy Act (NEPA), and the Council on Environmental Quality's Regulations for Implementing NEPA, the Environmental Protection Agency (EPA) Region 6 Office in Dallas, Texas, has completed its review of the Minerals Management Service (MMS) Draft Supplemental Environmental Impact Statement (DSEIS) on the Proposed Gulf of Mexico OCS Oil and Gas Lease Sales: 2009-2012; Central Planning Area Sales 208, 213, 216, 222; and Western Planning Area Sales 210, 215, and 218. The DSEIS reexamined the analysis presented in the previous Multisale EIS. No significant new information was found that altered impact conclusions originally presented this lease sale. The DSEIS stated that the altered lease sale would cause negligible increases in environmental and socioeconomic impacts.

EPA therefore rates the DEIS as **LO, Lack of Objections.** EPA has no objections to the selection of the preferred alternative. Our classification will appear in the *Federal Register* according to EPA's responsibility under Section 309 of the CAA, to inform the public of our views on proposed federal actions. If you have any questions, please contact me at (214) 665-7451 or e-mail me at jansky.michael@epa.gov for assistance. Please send our office two copies of the Final Supplemental EIS when it is sent to the Office of Federal Activities, EPA (Mail Code 2252A), Ariel Rios Building, 1200 Pennsylvania Ave, N.W., Washington, D.C. 20460.

Sincerely yours,

Michael P. Jansky
Regional EIS Coordinator
Office of Planning and
Coordination (6EN-XP)

USEPA Comment noted.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
646 Cajundome Blvd.
Suite 400
Lafayette, Louisiana 70506

June 6, 2008

Memorandum

To: Regional Supervisor, Minerals Management Service
Gulf of Mexico OCS Region
New Orleans, Louisiana

From: Supervisor, U.S. Fish and Wildlife Service
Louisiana Field Office
Lafayette, Louisiana

Subject: Review of Draft Supplemental Environmental Impact Statement for the *Gulf of Mexico OCS Oil and Gas Lease Sales: 2009-2012*

The U.S. Fish and Wildlife Service (Service) has reviewed the subject Draft Supplemental Environmental Impact Statement (DSEIS) for the *Gulf of Mexico OCS Oil and Gas Lease Sales: 2009-2012*, administered by the Minerals Management Service (MMS), Gulf of Mexico Outer Continental Shelf (OCS) Region. This DSEIS was prepared to analyze the potential environmental effects of oil and natural gas leasing, exploration, development and production in the 181 South Area for the proposed Central Planning Area sales. This DSEIS also analyzes any new information available for the Central and Western Planning Areas since the publication of the recent Environmental Impact Statement for the *Gulf of Mexico OCS Oil and Gas Lease Sales: 2007-2012*. Comments regarding the DSEIS are provided below by the Louisiana Field Office (LAFO) in behalf of the Service's Southeast Region. Comments regarding the DSEIS from the Service's Southwest Region will be transmitted by separate cover.

The current DSEIS document is a notable improvement and is easier to follow than the recent Environmental Impact Statement for the *Gulf of Mexico OCS Oil and Gas Lease Sales: 2007-2012* and incorporates many of our comments regarding the 2007-2012 document. To further clarify the analyses of impacts discussed in the DSEIS, we provide the following comments and recommendations.

<u>Comments and Recommendations</u>

The document is relatively large, thorough, and addresses a diversity of issues. To better understand how information from a specific page addresses the scope of the oil and gas lease sales program, we recommend the authors include subchapter and subheading titles in the page headers of the DSEIS.

FWS-1 Page 3-14: Figure 3-2, rather than Figure 3-3, shows the location of active pipelines near the 181 South Area. We recommend the reference to Figure 3-3 be changed to point the reader to Figure 3-2.

FWS-2 Page 3-27: The DSEIS states that updated spill occurrence probabilities have been computed based on the higher production estimates from inclusion of the 181 South Area. We recommend that information be provided in the final document.

FWS-3 Page 3-27: Figures 3-6 through 3-11 are referenced and include probabilities of an oil spill contacting beach mice and Gulf sturgeon (*Acipenser oxyrynchus desotoi*) habitats. We recommend figures depicting the same type of information for the other federally listed species [*i.e.*, piping plover (*Charadrius melodus*), brown pelican (*Pelecanus occidentalis*), whooping crane (*Grus americana*), West Indian manatee (*Trichechus manatus*) and sea turtles] within the proposed action area be provided as well. Otherwise, an explanation for not providing such information should be given.

FWS-4 Page 4-115: The paragraph dedicated to the discussion of brown pelicans is missing a heading. This is inconsistent with the organization of the document. We recommend that paragraph be given an appropriate heading.

FWS-5 Page 4-118: The discussion of impacts to coastal and marine birds from routine events addresses potential impacts to migratory birds from OCS platforms. We recommend MMS require that OCS platforms use directed/down-shielded low-sodium lighting or strobe lighting instead of standard incandescent lighting to reduce adverse impacts to migrating birds caused by lights.

FWS-6 Page 4-125: Lake St. Catherine, rather than Lake Catherine, should be listed as critical habitat for the threatened Gulf sturgeon.

Thank you for the opportunity to review the subject DSEIS. If you have any questions regarding the provided comments, please contact Rob Smith at (337) 291-3134.

Cc: Clear Lakes Field Office
Corpus Christi Field Office
Daphne Field Office
Jackson Field Office
Panama City Field Office
Region 4 Office – Ken Graham

FWS-1 The reference to **Figure 3-3** has been corrected to refer to **Figure 3-2**.

FWS-2 Inclusion of the 181 South Area increased the estimate of oil production for a CPA proposed action by 0.031-0.044 BBO and the proposed CPA sale area by 4.3 million ac (6,719 mi^2; 17,402 km^2). For this SEIS, the OSRA model was rerun due to the revised geographic area and increased oil production estimates in comparison with those used for the Multisale EIS. Results from this OSRA run confirmed that the revised geographic area and increased oil production estimates did not substantially affect probabilities in comparison with those obtained from the previous OSRA run. Updated spill occurrence probabilities that were computed based on these higher production estimates are shown in **Table 3-1**. The additional oil production is not projected to substantially increase the probabilities for occurrence of offshore spills ≥1,000 bbl (**Table 3-6)**. Activity that would result from the addition of the 181 South Area would cause a negligible increase, if any, in the risk of an offshore spill ≥1,000 bbl occurring and contacting environmental resources (**Figures 3-6 through 3-11**).

FWS-3 See the response to Comment FWS-2. For this SEIS, the OSRA model was rerun for all environmental resources due to the revised geographic area and increased oil production estimates in comparison with those used for the Multisale EIS. Results from this OSRA run confirmed that the revised geographic area and increased oil production estimates did not substantially affect the probabilities of oil spills contacting the piping plover, brown pelican, whooping crane, West Indian manatee, and sea turtles. Since the probabilities of oil spills occurring and contacting these resources has not changed with the addition of the 181 South Area, figures for these probabilities were not included with this SEIS.

The ranges of the four subspecies of beach mice were revised for this SEIS, based on input from FWS. Also, the critical habitat for Gulf sturgeon was not included in OSRA models run for the Multisale EIS; therefore, the OSRA model was run for beach mice and Gulf sturgeon critical habitat and the results are presented in the SEIS.

FWS-4 A subheading for the brown pelican was added to **Chapter 4.1.9** of the Final SEIS.

FWS-5 In this case, MMS referred to the jurisdiction of FWS and their guidelines for migratory birds (not specific on platforms). The USCG further regulates obstruction lighting, usually requiring white (sometimes red) incandescent lights for navigation warning. As for the recommendation of using directed/down-shielded, low-sodium lighting or strobe lighting instead of standard incandescent lighting to reduce adverse impacts to migrating birds, FWS concluded that minimum-intensity, maximum off-phased white strobe lighting is the preferred night lighting system by FAA (for communication towers >200 ft above ground level). Where white strobe lights are not reasonable, FWS provisionally recommended minimum-intensity, maximum off-phased red strobes, followed by minimum-intensity, red-blinking incandescent lights. The FWS recommends that all lighting be replaced with strobes or blinking incandescent lights (Manville, 2001). The FWS and FAA require these recommendations for communication towers, not for OCS platforms.

The MMS would need further studies to recommend specific lighting for OCS platforms that would focus on recommendations and requirements from other Federal agencies. These studies would also account for migratory birds and safety concerns. The FWS is encouraged to issue guidelines for platforms similar to those guidelines for communication towers and onshore wind turbines.

FWS-6 The reference to Lake Catherine has been corrected to refer to Lake St. Catherine.

BOBBY JINDAL
Governor

State of Louisiana
Office of the Governor

June 10, 2008

Mr. Joseph A. Christopher
Regional Supervisor
Leasing and the Environment (MS 5410)
Minerals Management Service
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

RE: **C20080205**, Notice of Availability of a Draft Supplemental Environmental Impact Statement and Public Hearings for Proposed Central Planning Area Lease Sales 208, 213, 216, and 222; and Proposed Western Planning Area Lease Sales 210, 215 and 218

Dear Mr. Christopher:

On April 4, 2008, my office received your letter in which MMS announced the availability of the Draft Supplemental Environmental Impact Statement (DSEIS) and seven oil and gas lease sales in the Central and Western Planning Areas as scheduled in for 2009-2012 in the 5-year program. Following are the State of Louisiana's comments on this DSEIS.

Introduction

For more than half of a century, coastal Louisiana has served as the gateway to the Gulf of Mexico for the exploration and production of energy resources. Southward of its shoreline, crossing the outer continental shelf, and extending to the limit of federal waters, is one of the largest and most reliable sources of energy in the United States. The Gulf of Mexico produces vast amounts of conventional hydrocarbons, and holds tremendous stores of methane hydrates. It also has the potential to produce energy from alternative sources, such as wind or ocean currents. The Gulf provides other important natural resources as well. Most notable are the commercial and recreational fisheries, but it also supports unique coral reef and chemosynthetic ecosystems. The natural resources of the Gulf of Mexico are fundamental to the security and prosperity of the United States of America.

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The federal waters offshore of all five Gulf States have the potential to produce conventional resources. Louisiana's unique geology, however, has led to the highest density of these resources being located in the central region of the Gulf. Indeed, many of the same geologic processes that created the abundance and diversity of these resources are responsible for the diverse and dynamic coastal zone of Louisiana. It is this relationship that has led to the current quandary, as discussed below.

Coastal Louisiana, because of its proximity to these resources and to offshore waters, and its willingness to create and expand, has become the nexus for the physical and social infrastructure that supports exploration and production activities in federal waters throughout the Gulf of Mexico. The activities concentrated here resulting from constructing and maintaining this infrastructure are exacting a heavy toll from this valuable area, including but not limited to the unmitigated loss of coastal wetlands, and less visible (but not less important) social and economic impacts.

While Louisiana does benefit from its own exploration and production activities, and to some extent those in federal waters, the damage incurred in its coastal zone is significant, well documented, in some ways irreversible, and is disproportionate to the benefits realized by Louisiana and to the damage incurred in other Gulf States that participate in offshore activities. It is undeniable that federally sanctioned offshore activities are a major contributor to this damage.

The State of Louisiana has repeatedly iterated that it has and would like to continue to encourage and support the efforts to explore for and produce the natural resources located in the Gulf of Mexico. In recent responses to MMS's NEPA documents, we have commented that activities must be permitted only following a meaningful and comprehensive analysis of the potential impacts – direct, indirect, and cumulative – to the State's coastal environment. Louisiana has expressed serious concerns about the validity of the methods used to evaluate the impacts to its coastal zone and the quality of the NEPA documents that are based on these methods, especially in light of the devastation caused by Hurricanes Katrina and Rita in 2005. Indeed, these very concerns led to the 2006 case of *Blanco v. Burton.* In the settlement agreement, MMS agreed to produce a new EIS that would consider, among other things, the impacts associated with past lease sales, including Lease Sale 200, in its analysis of cumulative impacts.

This new EIS is embodied as the Multisale Final Environmental Impact statement (FEIS) for Gulf of Mexico Oil and Gas Lease Sales: 2007-2012. The State of Louisiana has made clear in its letter dated May 14, 2007, from Mr. Gerald M. Duszynski to Mr. Joseph A. Christopher, *Comments on the Final Multisale Environmental Impact Statement* (attached for reference), that while some improvements have been made in MMS's subject matter treatment of our stated issues in NEPA documents for its Lease Sales, there remain critical shortcomings in many areas of the FEIS. These areas include, but are not limited to: Hypothetical Analysis of Impacts, Mitigation, Alternatives to Area Wide Leasing, The Endangered Species Act, Impacts to Port Fourchon, Lafourche Parish, and LA Highway 1, Other Communities, Cumulative Analysis of "Unexpected Events", and Environmental Analysis of Additional Acreage Available Under the Gulf of Mexico Energy Security Act.

The State has expectations that the FSEIS that will follow this DSEIS will address the concerns stated above regarding the Multisale FEIS, as well as include analysis and discussion of the concerns provided in its responses to the calls for information and Notice of Intent (NOI) documents to produce this SEIS to the 2007-2012 Multisale FEIS.

Discussion

The State of Louisiana has taken two opportunities to comment on the preparation of this DSEIS. The first was the October 22, 2007, letter from Mr. Gerald M. Duszynski to Mr. Joseph A. Christopher. This letter was in response to a request contained in the announcement regarding the *Notice of Intent (NOI) to prepare this Supplemental Environmental Impact Statement (SEIS)*. The request was for comments and input to improve or reevaluate certain sections, including those involving forecasting methods for impact evaluation.

The State included requests, suggestions, and concerns regarding several sections of this DSEIS in its response. Below are direct quotes from this letter:

> "We anticipate that the forthcoming SEIS will include a discussion of past predicted and actual effects, and an analysis of the shortcomings of the models and predictive techniques used and how those shortcomings are addressed in the current evaluation."

> "The State needs to see better treatment of cumulative and indirect impacts in MMS's scientific documents."

> "A more comprehensive review of these environmental risk factors must be included in the upcoming SEIS."

> "In order to ensure that its assessment of the impacts of the lease sales is as accurate as possible, it is essential that MMS compare such assumptions, estimates, and projections with actual experience, in order to determine their validity and make appropriate

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> refinements, and document this comparison for public review in the SEIS. Further, the SEIS should include a discussion of the methodologies used by MMS to predict environmental and social impacts, and any actions taken or planned to verify these methodologies through examination of the accuracy of earlier predictions."
>
> "One important aspect of Pipeline Landfalls section is that it fails to take into account the potential for increased use of Floating Production, Storage and Offloading Systems (FPSO's) in the future, especially in the deeper waters of the Gulf of Mexico. Rather than installing costly pipelines to serve deeper and more distant locations in the Gulf, there will likely be an increase in the use of FPSO's and tankers to shuttle oil to refineries. This trend should be examined in the analysis, including its effect in reducing the number of traditional pipeline landfalls. If this trend develops MMS should expect some significant increase in marine traffic as the product from the FPSO's is moved to shore via tankers. What does this increase portend for ports, shipping lanes, etc?"

The second opportunity taken to comment on the preparation of this DSEIS was the October 23, 2007, letter from Mr. Gerald M. Duszynski to Mr. Joseph A. Christopher in response to the *Call for Information on the 181 South Area and Nominations/Notice of Intent to prepare a Supplemental Environmental Impact Statement for Western and Central Gulf of Mexico Planning Area Lease Sales for 2009 to 2012.*

The State included requests, suggestions, and concerns regarding the proposed activities in its response. Below are direct quotes from this letter:

> *Call for Information on the 181 South Area*
>
> "Since the 181 South Area is an area that has never been leased before, it has certain characteristics that should be considered in the SEIS."
>
> "MMS should analyze these differences in transportation infrastructure and their likely impact on Louisiana's coastal resources."
>
> "These differences and potentials for petroleum production should be presented in the SEIS along with any unusual safety or environmental impacts they may present in the exploration production and transport of petroleum products."

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Notice of Intent to prepare a Supplemental Environmental Impact Statement for Western and Central Gulf of Mexico Planning Area Lease Sales for 2009 to 2012.

> "Hurricanes Katrina and Rita resulted in significant new and changing issues that must be thoroughly considered by the MMS in the SEIS process. MMS must ensure that it thoroughly examines the environmental impacts of the proposed lease sales in light of the current environmental and socioeconomic baseline."
>
> "In this regard, the SEIS must explain how MMS will ensure that any potential adverse impacts to wetlands and other important coastal features and resources will be mitigated."
>
> "Appropriately, MMS has recognized the existence of additional informational needs regarding OCS leasing activity and its onshore impacts in the wake of Hurricanes Katrina and Rita. The State understands that MMS is working with Louisiana State University's Coastal Marine Institute ("CMI") to design and fund two studies to gather information on these hurricane-related issues: (1) "Spatial Restructuring and Fiscal Impacts in the Wake of Disaster: The Case of the Oil and Gas Industry Following Hurricanes Katrina and Rita"; and (2) "Post Hurricane Assessment of OCS-Related Infrastructure and Communities in the Gulf of Mexico Region." In its EA for Lease Sale 200, MMS stated that "[i]nformation from these studies will be incorporated into future MMS NEPA documents." Lease Sale 200 EA at 12. We further understand that MMS is working with CMI on a study titled "Gulf Coast Subsidence and Wetland Loss: A Synthesis of Recent Research" to "highlight and quantify important potential socioeconomic impacts of coastal land loss that can be included in future EIS analyses of upcoming lease sales" and develop an understanding that "will be important in determining the impact of future coastal land loss on upcoming lease sales and offshore activities." The information from these studies is critical to understanding the impact of the hurricanes on existing OCS-related onshore infrastructure and the development of future infrastructure, and to an accurate analysis of the impacts of the lease sales covered under the SEIS. Therefore, the State believes that the information from these studies must be incorporated into this SEIS."
>
> "The incorporation of these study results into the SEIS is particularly important when considering Judge Kurt Engelhardt's assessments of MMS's consideration of Hurricanes Katrina and Rita in the 2006 case, *Blanco v. Burton*. For example, the judge found, with respect to MMS's past treatment of Hurricanes Katrina and Rita in their NEPA documents that, with little or no analysis as to why, MMS

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> concludes virtually every discussion of changes caused by the hurricanes with a generalized statement that its prior conclusions as to the impacts of OCS activities in connection with Lease Sale 200 remain unchanged. *Abbreviated summaries and unsupported conclusions do not suffice for insightful and well-reasoned analysis of potential significant impacts as the result of changed circumstances*."[1]
>
> "Prior conclusions are not applicable to post-Katrina/Rita Louisiana. There is simply no room for such corner-cutting any longer in MMS's NEPA documents. MMS needs to see the above-noted studies through to completion and incorporate their findings into the proposed SEIS."
>
> "MMS should ensure that the SEIS thoroughly consider the cumulative impacts of the proposed lease sales. This should include, among other impacts, cumulative impacts associated with: past and ongoing OCS-related activity, particularly on the resources, communities, and infrastructure in coastal Louisiana; and future planned OCS lease sales. It also should include relevant non-OCS activities and impacts, including, but not limited to, liquefied natural gas facilities and their impacts, and the reasonably foreseeable impacts of heightened storm activity as is now being predicted for the coming decades."

Both of these letters clearly illustrate that the State of Louisiana continues to be concerned with the quality and validity of the scientific and environmental documents that are being created to support the agenda of the Minerals Management Service of the United States Department of the Interior.

Comments

After thorough review of this DSEIS, it is evident that the majority of the State's requests, suggestions and concerns set forth in the above referenced comment letters regarding this DSEIS have not been addressed.

Impacts to the Louisiana Coastal Zone

LA-1

Specifically, the *Coastal Impact-Producing Factors and Scenario*, found at Section 3.1.2., refers heavily to the Multisale FEIS, and contains no significant discussion of past predicted and actual effects, and analysis of the shortcomings of the models and predictive techniques used or how those shortcomings are addressed in the current evaluation. No significant discussion of the methodologies used by MMS to predict environmental and social impacts, and any actions taken

[1] *Blanco v. Burton*, Order and Reasons, p. 19 (E.D. La. 2006) [emphasis added].

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LA-1

or planned to verify these methodologies through examination of the accuracy of earlier predictions is noted. While several completed or ongoing studies have been incorporated by reference, this is no substitute for the inclusion of an explicit discussion of the above issues in this SEIS for public review as requested by Louisiana. It is expected that the final SEIS will include the previously requested comprehensive discussion.

LA-2

Further, in Chapter 4, *Environmental and Socioeconomic Consequences*, at Section 4.1.2., *Coastal Waters*, Section 4.1.3., *Sensitive Coastal Environments* (specifically *Wetlands* at 4.1.3.2.), and section 4.1.16., *Land Use and Coastal Infrastructure,* this SEIS generally concludes, with minor exceptions, that no new information has been found that necessitates a reanalysis of routine, accidental, indirect or cumulative impacts, or a change to scenarios that are used to predict such impacts, that are set forth in the Multisale FEIS. Considering the lack of pertinent discussion in Section 3.1.2., the State disagrees with these findings. The State of Louisiana expects that the final SEIS will include more comprehensive treatment of cumulative and indirect effects to the coastal zone as previously requested. It also expects that the thorough reassessment of the Coastal Impact-Producing Factors and Scenario discussed above should result in the finding of new and significant information that will necessitate changes in both the Scenario and Consequences.

LA-3

In regard to the State's request for discussion about the future use of Floating Production, Storage and Offloading Systems (FPSO's), in the deep waters of the Gulf of Mexico, this DSEIS does include discussion of this type of facility and associated operations at sections 3.1.1.2.2.1., and 3.1.1.4.3. The discussion; however, is brief and does not fully address the concerns raised by the State regarding long term trends in marine traffic and the implications for ports and federally maintained navigation channels in the coastal zone. Recently, the first FPSO system has been approved for use in the Gulf of Mexico. This represents a paradigm shift in deep water production and transport to market activities. It can be expected that use of FPSO's and related lightering activities will only increase and as such, the State expects that the final SEIS will include the previously requested analysis and discussion of long-term trends.

LA-4

In regard to the requested input on the addition of the 181 South Area, the State finds minimal consideration of the possible impacts. It is noted that this DSEIS mentions that increased helicopter traffic may be expected from this proposed action. Again however, in almost every pertinent section in chapters 3 and 4 this DSEIS generally concludes, with minor exceptions, that no new information has been found that necessitates a reanalysis of routine, accidental, indirect or cumulative impacts, or a change to scenarios that are used to predict such impacts, that are set forth in the Multisale FEIS. This SEIS neglects to discuss in detail related issues such as FPSO's, which will play a major role in the development of this area. It mentions only briefly the chemical and physical characteristics of hydrocarbons produced from this area, which may

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LA-4

behave differently than hydrocarbons typically produced from other regions of the Gulf when spilled, and neglects any discussion of new measures that may be required to properly abate a spill of this type. The State of Louisiana expects that the final SEIS will properly address these issues as previously requested.

LA-5

In addition to these aforementioned comments, the State of Louisiana believes that several issues are being ignored in the *Coastal Impact-Producing Factors and Scenario,* and in the impacts it predicts. Concerning pipelines, MMS seems to consider only land falls in its scenario. While pipeline land falls are a significant factor, new construction and maintenance of the existing pipeline network in federal waters seems to be largely ignored. In many NEPA documents, MMS refers to the existing network as mature, presumably implying that it is substantial enough in capacity and geographic extent to handle the future transportation needs of oil and gas in the Gulf of Mexico. It could also be interpreted that a "mature" network is aging, degraded, and in need of constant maintenance.

The majority of pipeline maintenance and new construction activities has been, and presumably will continue to be, based in coastal Louisiana. It is also apparent that the majority of drilling rigs and structures, along with the associated materials and personnel has been, and will continue to be, supplied from coastal Louisiana. Due to the existing infrastructure here, it is not unreasonable to predict that it will also serve this role well into the future.

LA-6

It is stated in several places in this DSEIS that the proposed activities will contribute to maintenance of existing navigation channels. The State of Louisiana has identified the maintenance dredging practices for existing navigation channels to be a primary cause for the degradation and loss of an array of coastal habitats. It has also identified the continuing trend of widening and deepening these navigation channels to support larger, deep draft vessels as a contribution to degradation and loss of coastal habitats. Further, several dredging events have been conducted solely to facilitate the transportation of large production structures, fabricated in the coastal zone, out to federal waters. These episodes have resulted in additional dredging and non-beneficial use of the materials dredged, both of which represent serious concerns for our coastal resources.

This DSEIS states, at 4.1.3.2.2., that due to the proposed action, vessel traffic and vessel size may increase due to supply needs and open sea conditions, and also states on page 4-42 that OCS activities are expected to require channel deepening. As such, the State fully expects that the final SEIS will quantitatively analyze and discuss the impacts of navigation by service vessels for the purposes of exploring, developing, and producing the offshore natural resources of the

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LA-6

Gulf of Mexico, on maintenance dredging activities in Louisiana's coastal zone. In relation to this topic the State finds it unacceptable to use a "round trip" method of service vessel activity to determine marine traffic volume. This method defines a trip as the transportation from a service base to an offshore site and back. This artificially reduces the estimated traffic volume by a factor of two, and thus reduces the apparent effects on navigation channels by the same factor.

LA-7

Also related to the issue of pipelines and structures in federal waters is the impact to other users such as fisheries industries. The State requests that the final SEIS include discussion of what the federal Fisherman's Contingency Fund (NOAA Program 11.408), authorized under the Outer Continental Shelf Lands Act Amendments of 1978, Title IV, Section 402, reveals about user conflicts.

LA-8

The State of Louisiana expects that all of the requests in this section (Impacts to the Louisiana Coastal Zone) will be considered in terms of the cumulative effects of past and future direct and indirect actions. It also expects that the thorough reassessment of the *Coastal Impact-Producing Factors and Scenario* discussed above should result in the finding of new and significant information that will necessitate changes in both the *Coastal Impact-Producing Factors* section and the *Scenario* & *Environmental and Socioeconomic Consequences* section of the DSEIS.

Consideration of Tropical Storm Effects on Offshore Activities and the Louisiana Coastal Zone

LA-9

The State acknowledges the efforts of MMS to include the effects of tropical storms in the Gulf of Mexico in this DSEIS. At minimum, the devastating effects of some of the recent major hurricanes have been recognized. However, the State notes that the studies referenced in the October 23, 2007, letter from Mr. Gerald M. Duszynski to Mr. Joseph A. Christopher have not been incorporated and thus contends that MMS has not thoroughly examined the environmental impacts of the proposed lease sales in light of the current environmental and socioeconomic baseline. The *Coastal Impact-Producing Factors and Scenario* discusses the impacts of spills and mudslides related to hurricanes, and gives brief attention to impacts on service bases, but provides no comprehensive explanation as to how these impacts affect the use of the *Coastal Impact-Producing Factors and Scenario*. Recurring throughout this document are slight variations of the following statement: "this SEIS concludes that no new information has been found that necessitates a reanalysis of routine, accidental, indirect or cumulative impacts, or a change to scenarios that are used to predict such impacts, that are set forth in the Multisale FEIS." This statement indicates that the effects of tropical storms are not fully considered in most aspects of both the *Coastal Impact-Producing Factors* section and the *Scenario &*

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LA-9

Environmental and Socioeconomic Consequences section of the DSEIS. The State of Louisiana expects, as previously requested, that the final SEIS will fully incorporate the findings of final or ongoing studies into the reassessment and adjustment of the *Coastal Impact-Producing Factors and Scenario*.

Mitigation of Impacts to the Louisiana Coastal Zone

LA-10

Considering the concerns of the State regarding the accuracy and validity of MMS's models and scenarios, and the impacts they predict, and the lack of discussion pertaining to the efforts to validate and adjust them, it seems unlikely that the mitigation efforts described in this DSEIS are suitable for the actual impacts that the coastal zone is experiencing. As such, the State of Louisiana expects that the previously requested reanalysis and adjustment of the *Coastal Impact-Producing Factors and Scenario,* will lead to the reevaluation and amendment of these mitigation efforts, and that this new mitigation plan will be included in the final SEIS.

Conclusion

As it has for the past half century, Louisiana will continue to support and encourage the efforts to explore, develop and produce the natural resources of the Gulf of Mexico. However, these activities must be permitted only following a meaningful and comprehensive analysis of the potential impacts – direct, indirect, and cumulative – to Louisiana's coastal environment. It is the State's contention that this DSEIS does not represent a meaningful and comprehensive analysis of the potential impacts – direct, indirect, and cumulative – to Louisiana's coastal environment. The State further contends that the MMS is not adhering to the conditions agreed upon in settling the 2006 *Blanco vs. Burton* lawsuit, and is continuing to produce NEPA documents consisting mostly of abbreviated summaries and unsupported conclusions that do not suffice for insightful and well-reasoned analysis of potential significant impacts.

The MMS has stated that this DSEIS will also serve as the required NEPA documents (Environmental Assessment and either Finding of No New Significant Impact or SEIS) for the next two lease sales. Louisiana has made clear in this letter that it does not agree with the finding of no new significant impacts stated throughout this draft SEIS. This disagreement is not based solely on the laws and regulations pertinent to this matter. It is further based on the State's real need for the accurate analysis and prediction of coastal zone impacts. This is the type of vital information that Louisiana needs in order to plan and implement measures that could ensure a sustainable, working coast, not only for the future of offshore energy production, but more importantly, for the safety and prosperity for its citizens. Unless the final version of this Supplemental Environmental Impact Statement to the Multisale FEIS incorporates all of the State's requests, Louisiana may be left with no choice but to find the proposed lease sales covered under this document inconsistent with its approved Coastal Resources Program.

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I suggest that my staff meet, at the earliest opportunity, with the appropriate members of your staff to discuss and resolve these critical issues in person. If you have any questions or comments regarding these comments please contact Garret Graves, my Executive Assistant for Coastal Activities at 225-342-3968.

Sincerely,

Garret Graves, Executive Assistant to the Governor,
Coastal Activities

/pso

Enclosures (3)

cc: Scott A. Angelle, Secretary, Louisiana Department of Natural Resources
Gerry Duszynski, Acting Assistant Secretary, OCRM, LDNR
Jim Rives, Administrator, Coastal Management Division, LDNR
James D. Caldwell, Attorney General
Ryan M. Seidemann, Assistant Attorney General
David M. Kennedy, Director, NOAA, Office of Ocean and Coastal Resource Management
David Kaiser, NOAA, Office of Ocean and Coastal Resource Management, Coastal Programs Division
Dirk Kempthorne, Secretary of the Interior
Lars T. Herbst, Director, Minerals Management Service
Chris Oynes, Associate Director, Offshore Minerals Management Program
Stephen L. Johnson, Administrator, United States EPA
Richard Greene, Regional Director, EPA Region 6
Consistency file C20080205

The following are responses to specific comments provided in the State of Louisiana's June 10, 2008, letter on the Draft SEIS. Additionally, in order to more fully respond to Louisiana's concerns expressed in this letter and previous correspondence, MMS recently held two meetings in Baton Rouge, Louisiana, with staff from the Louisiana Department of Natural Resources (LADNR) to facilitate a more open dialogue and to discuss particular issues of interest to the State. The first meeting, held on June 16, 2008, focused primarily on wetland issues. Staff from the U.S. Geological Survey (USGS) also attended the meeting to discuss MMS-funded wetland studies that they are conducting. At that meeting, LADNR staff expressed interest in learning more about MMS's studies process, including the Coastal Management Institute (CMI) process, so a follow-up meeting was held on July 15, 2008, to provide that information, as well as information on particular studies of interest to the State. Staff from MMS, LADNR, USGS, and Louisiana State University (LSU) attended that meeting. It was mutually agreed that the two meetings were very productive and that open lines of communication between the agencies should be maintained.

LA-1 The State of Louisiana asserts that the *Coastal Impact-Producing Factors and Scenario* (**Chapter 3.1.2**) fails to provide a significant discussion of past predicted and actual effects or discusses the methodologies used by MMS to predict environmental and social impacts or verified the methodologies throughout examination of the accuracy of earlier predictions. The purpose of the *Coastal Impact-Producing Factors and Scenario* (**Chapter 3.1.2**) is to describe the primary coastal infrastructure and associated activities in support of offshore oil and gas extraction that could potentially affect the biological, physical, and socioeconomic resources of the Gulf of Mexico. The impact-producing factors and scenario described in **Chapter 3.1.2** are used to evaluate the routine and cumulative impacts upon environmental and socioeconomic resources, which are described in detail in **Chapter 4.1**.

The MMS disagrees with the State of Louisiana. The MMS has conducted and published scenario examinations (USDOI, MMS, 2007f and g; Dismukes et al., 2007), which were previously provided to the State of Louisiana for review. These documents are referenced throughout the SEIS. The State of Louisiana has also failed to realize that MMS has provided a significant discussion of the routine and cumulative impacts, both projected and actual, in **Chapter 4.1**. A summary of the information referred to above is described below.

The MMS recently analyzed historical data and validated past scenario projections of exploration and development activity, new pipeline landfalls, and new onshore waste disposal sites (USDOI, MMS, 2007f and g; Dismukes et al., 2007). The analyses showed that the majority of time the actual activity level was at or near the low end of the forecasted range. The analyses of potential environmental and socioeconomic impacts presented in past EIS's were based on these exploration and development activity scenarios that, in most cases, were actually overestimated. If the level of activity was overestimated, the environmental and socioeconomic impacts of a lease sale may have been overstated. In addition, a single lease sale accounts for only a small percentage of the total OCS activities.

This Final SEIS supplements the Multisale EIS and incorporates the Multisale EIS by reference. The 181 South Area was not analyzed in the Multisale EIS because a Congressional moratorium on certain areas of the Gulf of Mexico, including the 181 South Area, was in effect until December 2006. Therefore, MMS has prepared this SEIS to analyze the potential environmental effects of oil and natural gas leasing, exploration, development, and production in the 181 South Area for the proposed CPA sales. This SEIS also analyzes any new information available for the CPA and WPA since the publication of the Multisale EIS. The scenarios presented in this SEIS are intended to describe the level of activity that could reasonably result from a proposed lease sale. In order to present the best reasonable projections possible, MMS continuously updates models and formulas used to develop these scenarios. The experience of subject-matter experts is incorporated into this process, along with the latest industry trends and historical data. Much of the information on coastal infrastructure and activities presented in the Multisale EIS is from the MMS study, *OCS-*

Related Infrastructure in the Gulf of Mexico Fact Book (Louis Berger Group, Inc., 2004). Preliminary information from the MMS study developed to update that document, "Post-Hurricane Assessment of OCS-Related Infrastructure and Communities in the Gulf of Mexico Region," was included in both the Multisale EIS and Draft SEIS, as this information was the basis for updating current descriptions of, and for discussing the 2005 hurricane impacts (damage and recovery) to, all OCS-related onshore infrastructure. A preliminary draft of the entire report was recently reviewed and commented on by MMS, and publication of the final report is expected in January 2009. To date, no new information has been found that necessitates a change to the coastal infrastructure scenario presented in the Multisale EIS for either a proposed action or the OCS Program. A relatively minor amount of additional support activity is projected as a result of the addition of the 181 South Area; therefore, the coastal and offshore impact-producing scenarios are still representative of likely future activity from a CPA proposed action.

As stated in **Chapter 4.1.1**, the Clean Air Act Amendments of 1990 requires MMS to coordinate air-pollution control activities with USEPA. Thus, there will be a continuing need for emission inventories and modeling in the future. The MMS has completed two air emissions inventory studies for calendar years 2000 and 2005 (Wilson et al., 2004 and 2007, respectively). These studies estimated emissions for all OCS oil and gas production-related sources in the Gulf of Mexico, including non-platform sources, as well as other non-OCS-related emissions. Due to the impacts of the hurricanes on OCS facilities in 2005, an updated Gulfwide emissions inventory study is ongoing for calendar year 2008 and more inventory data have been collected. These emissions inventories will be used in air quality modeling to determine the potential impacts of offshore sources to onshore areas. The USEPA has implemented the new ozone standard of 75 parts per billion in 2008. In response to this new ozone standard, MMS is conducting a new study to investigate the ozone impacts with respect to the new 8-hour $O_{3.}$

A discussion of the methodology used to predict social impacts related to employment (and resulting population) can be found in Chapters 4.2.1.1.13.3 and 4.2.2.1.15.3 of the Draft and Final Multisale EIS's. To improve regional economic impact assessments and to make them more consistent across planning areas, MMS contracted the development of a new model called MAG-PLAN for estimating changes to employment and other economic factors. The detailed model documentation, developed by the contractor to describe the MAG-PLAN methodology, is cited in the Multisale EIS (Saha et al., 2005 and 2007). As part of the Bureau's ongoing effort to strengthen social impact analyses, MMS is about to award two additional contracts for studies related to the MAG-PLAN effort. First, MMS is establishing an outside panel of experts to serve as a MAG-PLAN model review board (MRB). The MRB will review the existing model and provide expert advice on the best approaches to improving MAG-PLAN and the data within it. The MRB will also provide guidance/review of key deliverables related to the second new contracting effort to improve the existing model. This second effort will focus on updating and verifying existing industry expenditure data, improving the existing methodology to allocate industry expenditures to onshore areas in the Gulf of Mexico, incorporating recent advances in technology and changes to industry practices (such as FPSO's and subsea tiebacks), and improving the user interface of the model.

Oil-spill rate projections published by Anderson and LaBelle are periodically verified prior to their use in NEPA documents (Anderson and LaBelle, 2000, 1994, and 1990; Amstutz and Samuels, 1984). Projected oil-spill rates are based on tracking the size and frequency of spill incidents that occur each year in comparison with the amount of oil handled. Spill rates have declined since recordkeeping began. In the most recent documents, MMS uses a rate based on spills from 1985 to 1999 rather than the entire spill record, 1974-2007, to reflect this decline. Following the 2004-2005 active hurricane seasons, the question about whether the rate had changed was raised. The rates were reexamined and found to still be appropriate (Anderson, personal communication, 2006).

In direct response to concerns expressed by the State of Louisiana, MMS has an ongoing study to investigate erosion rates along a number of coastal waterways in the Gulf of Mexico region. In addition to investigating channel-widening rates, the study will also document what portion of the channel banks are armored or protected by spoil banks and less likely to erode versus channel banks that are not protected and are more susceptible to erosion.

LA-2 The MMS has reexamined the analysis presented in the Multisale EIS based on the addition of the 181 South Area. In addition, MMS has also conducted a thorough search of new information (both published and unpublished) available since publication of the Multisale EIS. This search includes recently available information regarding impacts from past and future hurricanes on environmental and socioeconomic resources, and on coastal and offshore infrastructure. As a result, MMS has added a substantial amount of new, up-to-date information to the SEIS; this information is included in the cumulative impacts analyses. However, no significant new information was found that would alter the impact conclusions as presented in the Multisale EIS. In some cases, new information was found that further supported these conclusions. Please see the responses to Comment LA-6 regarding the cumulative impacts of the proposed lease sales and Comment LA-7 regarding the verification of scenario estimates by MMS.

LA-3 Chapter 4.1.1.8.3 of the Multisale EIS provides detailed information regarding the use, operations, and scenario associated with FPSO utilization. Chapter 3.1.1.4.3 of the Draft SEIS provided additional information related to the potential increase in use of FPSO's from the addition of the 181 South Area. At a peak production rate of 150,000 bbl/day, approximately 110 offloading events and shuttle tanker transits to Gulf coastal or offshore ports annually per FPSO are projected. This would result in a 2-3 percent increase in annual vessel traffic as a result of the additional production from the 181 South Area. The MMS has funded an ongoing CMI study with LSU that will provide updated estimates of OCS-related vessel traffic. The ongoing study will develop a methodology to forecast service-vessel trips related to all stages of OCS activities and to estimate the proportionate contribution of OCS-related vessel traffic to overall vessel traffic for each of the major channels used by OCS vessels, including the ports that will be used by shuttle tankers from FPSO's.

As stated in **Chapter 3.1.1.2.2.1**, MMS announced in January 2002, after a rigorous environmental and safety review, its decision to accept applications for FPSO systems. More than 5 years later, MMS received its first and only application to date for a development project proposing to use an FPSO (Petrobras America Inc.'s Cascade-Chinook Project). The MMS prepared a site-specific environmental assessment (EA) for the project (USDOI, MMS, 2008b). On December 13, 2007, the State of Louisiana determined that the project was consistent with the Louisiana Coastal Resources Program. **Chapter 3.1.1.2.2.1** goes on to state "the FPSO system is an especially good production system candidate for deployment in ultra-deepwater situations where the nearest pipeline tiebacks could be hundreds of miles or kilometers away." Therefore, MMS has projected an increase in the use of FPSO's in both the Multisale EIS and the SEIS. Future development plans proposing to use an FPSO will also require the preparation of an EA and, depending on the offshore location of the proposed project and/or the onshore activities associated with the proposed project, the plan will be provided to the State of Louisiana for a consistency review.

The use of FPSO's is not only projected for the 181 South Area but also for other areas in water depths >800 m (2,625 ft) in the WPA and the remainder of the CPA sale area. Up to 10 new production structures are projected as a result of a CPA proposed action in water depths >800 m (2,625 ft). Of those, up to six are projected to be FPSO's. **Tables 3-2 and 3-3** state that up to 37 percent and 59 percent of oil produced as a result of a CPA or WPA proposed action, respectively, is projected to be transported by shuttle tanker.

LA-4 Although the size of the proposed CPA sale area was increased due to the addition of the 181 South Area, there would be a negligible increase in environmental and socioeconomic impacts of an individual CPA lease sale. This negligible increase in impacts is the result of a number of different factors. The 181 South Area is located at the southeastern edge of the CPA sale area nearly 130 mi (209 km) from the nearest coast. A relatively minor amount of additional sale-related activity for the 181 South Area is projected because of the extreme water depths, the amount of interest in these water depths in recent lease sales, and the lack of recent seismic data. Drilling rig availability is still a limiting factor for exploration and development activity in the Gulf, and the 181 South Area would encounter the same rig availability issues as the rest of the Gulf. The minor increases in OCS activities in the 181 South Area could be handled adequately by existing personnel and infrastructure. Increases in indirect and secondary impacts of an individual CPA lease sale are also expected to be negligible. Therefore, the addition of the 181 South Area is projected to cause a minimal increase to the coastal impact-producing factors and scenario and is expected to have minimal impacts on environmental and socioeconomic resources.

Please see the response to Comment LA-3 regarding the future use of FPSO's in the deep waters of the Gulf of Mexico.

Chapter 3.2.1.5.2 states that the oil discovered within the 181 South Area, although somewhat heavier at 20-30 degrees API, will still be considered a medium-weight oil. Offshore response and cleanup technology that is presently available for a response to a medium-weight oil spill is discussed in **Chapter 3.3.1.5.2**. This available spill-response technology includes mechanical cleanup, dispersant use, and *in-situ* burning. If heavy oil is discovered, it may not be transported to market via pipelines. Companies would most likely seek other transport alternatives (e.g., shuttle tankers from FPSO's). However, additional data and analysis following publication of the Draft SEIS show that the quality of oil that may be discovered in the 181 South Area will likely be similar to that of oils discovered in other deepwater areas of the CPA. Due to the lack of existing pipelines in the vicinity of the 181 South Area, initial production would most likely be transported to market via shuttle tankers. Construction of new pipelines within the 181 South Area would depend on the location of production structures and the amount of production, but it would likely still connect to existing pipeline systems and would not result in new pipeline landfalls.

The section on dispersants further identifies that, although dispersant application may be one of the preferred response options for the 181 South Area, the window of opportunity for successful dispersant application on some of the heavier oil found in this area may be somewhat shorter, depending upon the chemical and physical properties of these deeper oils. If this was the case, the other response options would be utilized.

Spill-response equipment presently available within the Gulf of Mexico is expected to be adequate for a response to a medium-weight oil spill. If a change in the selection of available spill-response equipment that is cited within an operator's oil-spill response plan (OSRP) is deemed necessary due to the physical or chemical characteristics of a particular oil, MMS would require that these changes be made prior to approval of the OSRP.

LA-5 The installation of pipelines in Federal waters is described in **Chapter 3.1.1.4.1** (Offshore Impact-Producing Factors and Scenario) of the SEIS, as well as Chapter 4.1.1.8.1 of the Multisale EIS. **Table 3-2** of the SEIS provides the projected length of pipelines that may be installed in offshore subareas as a result of a proposed lease sale. Chapter 4.1.1.8.1 of the Multisale EIS describes in detail the existing pipeline network in the Gulf of Mexico, including installation trends, installation methods, pipeline burial, issues related to deep water, information regarding pipeline maintenance, inspection, and safety devices. During MMS's review of pipeline applications, protective safety devices are thoroughly evaluated, as well as plans for installation, maintenance, and inspections of the pipelines. The projected length of OCS pipelines to be installed during the 40-year analysis period is also included in Chapter 4.1.1.8.1 of the Multisale EIS. The installation rate includes consideration of expansion and replacement of the existing and aging pipeline infrastructure in the Gulf of Mexico. Only those pipelines entering coastal waters and reaching landfall are included in the Coastal Impact-Producing Factors and Scenario in the SEIS.

The MMS's minimum cathodic protection design criteria for pipeline external corrosion protection is 20 years. For the most part, pipelines have a designed life span greater than 20 years and, if needed, can be retrofitted to increase the life span. As for internal corrosion mitigation, companies are required to monitor products transported through the pipelines for corrosiveness. Based on the type of production, a company then mitigates the pipeline internal corrosion protection by injecting appropriate corrosion inhibitors and monitoring its effectiveness to prevent pipeline failures, thus extending the life of a pipeline. It should be noted that different products have different corrosive characteristics.

Should a pipeline need to be replaced due to integrity issues, a replacement pipeline is installed or alternate routes are used to transport the products, or a combination of the two. Besides replacement due to integrity issues, a pipeline may also be required to be replaced as result of storm or other damages. It is estimated that the overall pipeline replacement over the past few years is about 1 percent of the total installed.

LA-6 Waves generated by boats, ships, barges, and other vessels erode unprotected shorelines and accelerate erosion in areas already affected by natural erosion processes, resulting in the need for routine maintenance dredging of navigation channels. Other factors including storms, tides, natural deposition of sediment, and subsidence contribute to the need for maintenance dredging. The need for maintenance dredging cannot necessarily be attributed proportionately to the users of the navigation channels. Speed, vessel draft, and hull displacement are all factors that contribute to the erosion of channel banks and to the need for maintenance dredging. These factors vary greatly, not only between different types of service vessels, but between OCS-related and non-OCS-related vessels as well.

Numerous channels are maintained throughout the onshore cumulative impact area by Federal, State, county, commercial, and private interests. The COE is charged with maintaining all larger navigation channels in the cumulative impact area. The COE conducts periodic surveys on each navigation channel under its responsibility to determine the need for maintenance dredging. Maintenance dredging is then performed on an "as needed" basis. As per Louisiana Coastal Use Guideline 4.2, COE is required to use dredged material beneficially to the maximum extent practicable.

Dredging cycles vary broadly from channel to channel and from channel segment to channel segment. A cycle may be 1-6 years. Some shallower port-access channels may be deepened over the next 10 years to accommodate deeper draft vessels. These vessels, which support deepwater OCS activities, may include those with drafts to about 7 m (23 ft).

It is extremely difficult to determine to what degree OCS-related vessels contribute to the need for maintenance dredging. Although the need for maintenance dredging cannot necessarily be attributed proportionately to the users of the navigation channels, using these estimates is the most reasonable attempt to quantitatively analyze the contributions of offshore service vessels to the need for maintenance dredging. Based upon data collected by the COE's Waterborne Commerce Statistics Center and MMS's projections (total one-way trips), on average, 12 percent of the traffic using OCS-related navigation channels is related to the OCS Program (Tables 3-36 and 4-4 of the Multisale EIS). Based on the numbers of service-vessel trips projected for a proposed sale and the OCS Program (**Table 3-2** of the SEIS and Table 4-4 of the Multisale EIS), a proposed CPA sale is expected to contribute 2.5-4.1 percent of the total OCS Program usage; therefore, a proposed CPA sale would contribute 0.3-0.5 percent to the total commercial traffic using these navigation channels.

The estimates described above may be somewhat inflated since there was no adjustment for use of the armored canals subject to less erosion by much of the OCS-related vessel traffic. Increased bank stabilization efforts should decrease the amount of dredging required and increase the time period between dredging cycles. In response to concerns expressed by the State of Louisiana, MMS has funded two ongoing studies with LSU and USGS that are designed to provide better estimates of OCS-related vessel traffic and channel-bank erosion. The study being conducted by LSU will develop a methodology to forecast both service-vessel and helicopter trips related to all stages of OCS activities and to estimate the proportionate contribution of OCS-related vessel traffic to overall vessel traffic for each of the major channels used by OCS vessels. The study by USGS will analyze channel erosion rates for each major navigation channel used by OCS-related vessels. The results of these studies will provide more current, detailed information that can be used to extrapolate the potential contributions of OCS-related activities to the need for maintenance dredging.

Regardless of using roundtrips or one-way trips, a proposed sale is projected to account for only 1 percent of the total OCS and non-OCS traffic that occurs annually.

LA-7 The NOAA Fishermen's Contingency Fund (FCF) is discussed in the Multisale EIS as being established to provide recourse for the recovery of commercial fishing equipment losses due to entanglement with the OCS oil and gas structures and debris in the CPA and WPA (Chapter 4.1.1.3.3.4 of the Multisale EIS). The Multisale EIS further acknowledges that underwater OCS obstructions such as pipelines can cause loss of trawls and catch, business downtime, and vessel damage as potential commercial fisheries impacts in both the WPA and the CPA (Chapters 4.2.1.1.9 and 4.2.2.1.11, respectively). Additionally, the Multisale EIS presents the total financial payout for the FCF for the years 2003 ($107,989) and 2004 ($187,429) with a budget figure for 2005 ($1,144,938) as the latest data available on the NOAA FCF Program website (http://www.nmfs.noaa.gov/mb/financial_services/fcf.htm) (Chapter 4.1.1.3.3.4). This is still the latest data on the website.

The Office of Inspector General, Department of Commerce produced an audit report in August 1999, recommending a reassessment of the FCF because of the decline in claims from 1988 to 1998 (http://www.oig.doc.gov/oig/reports/1999/NOAA-STD-11484-08-1999.pdf).

LA-8 **Chapter 4.1** of the SEIS addresses the cumulative impacts of a proposed lease sale on environmental and socioeconomic resources, pursuant to NEPA. The cumulative analysis considers environmental and socioeconomic impacts that may result from the incremental impact of a proposed lease sale when added to all past, present, and reasonably foreseeable future human activities, including non-OCS activities, 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. Non-OCS activities include, but are not limited to, import tankering; State oil and gas activity; LNG facilities; recreational, commercial and military vessel traffic; recreational and commercial fishing; onshore development; and natural processes. The devastating effects of hurricanes on coastal communities, infrastructure, and environmental resources have also been discussed throughout the SEIS.

See the responses to Comments LA-1 and LA-2 above for information regarding impact-producing factors and scenarios.

A thorough search was conducted for any new information (published and unpublished) since completion of the Multisale EIS. All new information discovered was included in this Final SEIS. Comment letters from the State of Louisiana and the Louisiana Department of Natural Resources in response to the scoping public notice and the Draft SEIS did not identify any new significant information not already included in the SEIS or Multisale EIS.

LA-9 The three studies referenced in the October 23, 2007, letter from Gerald M. Duszynski to Joseph Christopher are ongoing. Two of the three ongoing studies that MMS has contracted with LSU, "Spatial Restructuring and Fiscal Impacts in the Wake of Disaster: The Case of the Oil and Gas Industry Following Hurricanes Katrina and Rita" and "Gulf Coast Subsidence and Wetland Loss: A Synthesis of Recent Research," will not be completed until 2009, following completion of this Final SEIS. Therefore, the information collected from these two studies will not be available for inclusion in this document, but it will be included in future NEPA documents. A preliminary draft of the study "Post Hurricane Assessment of OCS-Related Infrastructure and Communities in the Gulf of Mexico Region" was recently received by MMS. Preliminary information from this study was included in both the Multisale EIS and Draft SEIS. This information was the basis for updating current descriptions of, and for discussing the 2005 hurricane impacts (damage and recovery) to, all OCS-related onshore infrastructure.

In order to describe the level of activity that could reasonably result from a proposed action (i.e., proposed lease sale), MMS developed exploration and development activity scenarios. These scenarios provide a framework for the analyses of potential environmental and socioeconomic impacts of a proposed lease sale. **Chapter 3.1.1** of the SEIS describes the offshore impact-producing factors and scenario (including hurricane-induced mudslides) associated with the proposed lease sales that could potentially affect the biological, physical, and socioeconomic resources of the Gulf of Mexico, while **Chapter 3.1.2** describes the coastal impact-producing factors and scenario. **Chapter 3.3** discusses non-OCS activities, including hurricanes, that could potentially affect the same biological, physical, and socioeconomic resources.

The State of Louisiana asserts that the Coastal Impact-Producing Factors and Scenario (**Chapter 3.1.2**) provides no comprehensive explanation as to how impacts of spills and mudslides related to hurricanes affect the use of the Coastal Impact-Producing Factors and Scenario. The MMS disagrees with the State. The purpose of the Coastal Impact-Producing Factors and Scenario (**Chapter 3.1.2**) is to describe the primary coastal infrastructure and associated activities that could potentially affect the biological, physical, and socioeconomic resources of the Gulf of Mexico. The impact-producing factors and scenario described in **Chapter 3.1.2** are used to evaluate the routine and cumulative impacts upon environmental and socioeconomic resources, which are described in detail in **Chapter 4.1**. The description of the affected environment (**Chapter 4.1**) includes impacts from hurricanes on the physical environment, biological environment, and socioeconomic activities and OCS-related infrastructure. Changes in baseline data since Hurricanes Lili (2002), Ivan (2004), Katrina (2005), and Rita (2005) are considered in the assessment of impacts from the proposed actions to the resources and the environment. It is impossible to predict the frequency and severity of hurricanes over the 40-year analysis period for a proposed lease sale. However, MMS will update the environmental baselines in future environmental documents should future hurricanes reach landfall in the Gulf of Mexico. A description of hurricane cycles is described in **Chapter 3.3.7.2**.

The MMS has conducted a thorough search of new information (both published and unpublished) available since publication of the Multisale EIS. This includes recently available information regarding impacts from past and future hurricanes on environmental and socioeconomic resources, and on coastal and offshore infrastructure. As a result, MMS has added a substantial amount of new, up-to-date information to both the Multisale EIS and

SEIS; this information is included in the cumulative impacts analyses. However, no significant new information was found that would alter the impact conclusions as presented in the Multisale EIS. In some cases, new information was found that further supported these conclusions.

The coastal impact-producing factors section (**Chapter 3.1.2**) describes oil- and gas-related infrastructure that will likely be constructed, expanded, or maintained within the coastal zones of states along the Gulf of Mexico. The effects of hurricanes on safety issues are described in **Chapter 3.1.1.5.3**. The effects of tropical storms on socioeconomic and environmental resources are described in the cumulative impact analyses in **Chapter 4.1**.

LA-10 The State of Louisiana asserts that, regarding the accuracy and validity of MMS's models and scenarios, the impacts they predict, and the lack of discussion pertaining to the efforts to validate and adjust them, it seems unlikely that the mitigation efforts described in this SEIS are suitable for the actual impacts that the coastal zone is experiencing. The MMS disagrees with the State of Louisiana. The MMS recently analyzed historical data and validated past scenario projections of exploration and development activity, new pipeline landfalls, and new onshore waste disposal sites (USDOI, MMS, 2007f and g; Dismukes et al., 2007). The analyses showed that, for the majority of the time, the actual activity level was at or near the low end of the forecasted range. The analyses of potential environmental and socioeconomic impacts presented in past EIS's were based on these exploration and development activity scenarios that, in most cases, were actually overestimated. If the level of activity was overestimated, the environmental and socioeconomic impacts of a lease sale may have been overstated. At this time, a reevaluation of the mitigation efforts has not yet been conducted to determine the mitigation efforts for the reduced level of impacts recently discovered. A discussion of several models that are continuously updated, as well as current mitigation efforts, is described below.

The IIC EDP MODEL (Ashton et al., 2004a-c) is an expected value simulation of future Gulf of Mexico "field" discoveries. The model draws upon a set of default inputs and algorithms ("base case") that are specific to determining future annual exploratory well drilling, discoveries, oil and gas production, production and nonproduction well drilling, infrastructure additions and removals, and royalty revenue over a 40-year cycle. These default inputs and algorithms are generated from historical Gulf of Mexico oil and gas exploration, development, and production data from the MMS corporate database. The future course of exploration, development, and production activity levels in the Gulf of Mexico is primarily bound by the expected undiscovered resource distribution from the MMS's National Assessment of Technically Recoverable Oil and Gas Resources **(**Ashton et al., 2004a-c**)** and currently known existing fields (including estimates of ultimately recoverable resources).

The MMS contracted the development of an OCS regional economic impact model, known as MAG-PLAN **(**Saha et al., 2005 and 2007**),** to estimate employment, labor income, and other such socioeconomic phenomena impacts that may result from a proposed lease sale or the 5-Year Programs set of lease sales. The MAG-PLAN is a 2-stage model developed specifically for MMS and it currently has two versions: one for Gulf of Mexico activities and one for activities on the Alaska OCS based on input-output methodology frequently used in regional economic analyses. The first stage translates anticipated industry activity levels generated by the EDP model discussed in the previous paragraph (e.g., number of exploratory wells drilled, platforms added, pipeline miles added, etc., by well depth and water depth) from MMS-generated exploration and development scenarios into industry-sector-specific spending. These expenditures are then allocated in each of 15 MMS-defined onshore economic impact areas for the Gulf of Mexico model and in each of 3-4 areas for the Alaska model, depending on the location of the anticipated activities. The second stage applies these expenditure estimates to data from the widely used input-output modeling system, IMPLAN (http://www.implan.com/), to estimate the direct, indirect, induced, and total effects for each measure in a proposed action. The MAG-PLAN's direct effects can be thought of as the effects of local payroll and non-payroll expenditures of oil and gas companies, as well as of their immediate suppliers. (This varies slightly from the traditional definition because there is no sector that adequately represents the OCS oil and gas industry, much less the entities responsible for each stage of an OCS project. The MMS therefore uses a bill of goods approach to approximate a multi-sector industry for each stage of development.) Indirect effects are caused by the additional spending of other contractors and vendors as they supply the needs of the companies responsible for direct expenditures. Induced effects are the result of additional household spending of direct and induced income.

The MMS conducts a formal oil-spill risk analysis (OSRA) to support the EIS completed prior to conducting the proposed leasing of offshore areas because oil spills may occur from activities associated with offshore oil exploration, production, and transportation resulting from these lease sales. The objective of the analysis is to estimate the risk of oil-spill contact to sensitive offshore and onshore environmental resources and socioeconomic features from oil spills accidentally occurring from the OCS activities. The occurrence of oil spills is fundamentally a matter of probability. There is no certainty regarding the amount of oil that would be produced, or the size or likelihood of a spill that would occur, during the estimated life of a given lease sale. Neither can the winds and ocean currents that transport oil spills be known for certain. A probabilistic event such as an oil-spill occurrence or oil-spill contact to an environmentally sensitive area cannot be predicted; only an estimate of its likelihood (its probability) can be quantified. The OSRA is conducted in three parts corresponding to different aspects of the overall problem: (1) the probability of oil-spill occurrence, which is based on spill rates derived from historic data and on estimated volumes of oil produced and transported; (2) the trajectories of oil spills from hypothetical spill locations to locations of various environmental resources, which are simulated using the OSRA Model (Smith et al., 1982); and (3) the combination of results of the first two to estimate the overall oil-spill risk if there is oil development.

Chapter 2.1.2 provides information on existing mitigation categories, types, and potential mitigation enhancements applied by MMS. These mitigations include standard and site-specific mitigation to avoid or minimize impacts, and MMS develops and improves these mitigations whenever conditions warrant.

The LADNR feels that MMS should be providing compensatory mitigation for impacts caused by OCS activities. The purpose of this SEIS is to examine the potential impacts of a proposed lease sale on environmental and socioeconomic resources. Cumulative analyses are also included in order to put the incremental contribution of a proposed action in context, considering all of the other types of activities (past, present, and reasonably foreseeable) that have the potential to cause impacts similar to those analyzed for a proposed action, including impacts from the overall OCS Program. The incremental contribution of a proposed lease sale to these impacts is very small. Many of the impacts to environmental and socioeconomic resources that are identified in the cumulative analysis of this SEIS 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. Of particular importance are the National Environmental Policy Act (1969), the Clean Water Act (CWA) (1972), the Coastal Zone Management Act (CZMA) (1972), the Coastal Wetlands Planning, Protection and Restoration Act (CWPPRA) (1990), and the State of Louisiana's Coastal Use Program (1980). In recent years there has been a very high level of concern regarding wetland loss in coastal states, in particular Louisiana, and this has led to a "no net loss of wetlands" policy at the State and Federal levels. In today's regulatory climate, wetland loss related to oil and gas exploration, as well as other activities, is kept to an absolute minimum, and any losses are mitigated through their respective permit programs. It is important to point out that MMS only permits infrastructure emplaced on the OCS, and mitigation measures (primarily avoidance) are in place to protect any sensitive biological or archaeological resources along the pipeline route. Infrastructure constructed in State waters and onshore coastal areas are permitted by Louisiana pursuant to their Coastal Use Program and by COE pursuant to the CWA; under their control and jurisdiction, mitigation can be and frequently is required. The shorelines along the channel from Port Fourchon, which will be the primary service base for Lease Sale 208, have hard shoreline protection and have few, if any, areas where wetlands erode. The construction and maintenance of navigation channels are also regulated by the State of Louisiana and COE, and they have the authority to mitigate adverse environmental and socioeconomic impacts.

The MMS is neither a permitting agency nor an applicant for onshore pipelines, canals, dredging, dredged material placement, or infrastructure construction. The permitting agencies are the COE and the state in which the activity has or would occur. The applicants are the oil and gas companies seeking specific project approvals from COE and LADNR. A discussion of onshore mitigation most commonly applied by the permitting agencies is contained in Chapter 4.5.3.2 and Table 4-42 of the Multisale EIS. This table lists a variety of mitigation techniques, the associated decision processes, and the factors to consider.

Chapter 4.1.3.2.1 summarizes the recent, MMS-funded study, *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* (Johnston et al., 2007), which was recently published. The study looked at the dominant techniques used by the State and COE to construct and mitigate OCS-related pipelines and navigation canals that are effective in minimizing their effects on landloss, wetland loss, and habitat change. It was found that the magnitude of impacts from OCS-related pipelines described is inversely proportional to the quantity and quality of mitigation techniques applied. Pipelines with extensive mitigation measures appeared to have minimal impacts, while pipelines not backfilled and/or that had spoil banks remaining after construction attributed to significant habitat changes. Through proper construction methods, mitigation, and maintenance, impacts can be minimized or altogether avoided.

A reduction of canal widening in recent years was also noted, likely as a result of more aggressive management and the restoration of the canal edges to prevent erosion. Results indicate that management activities, including erosion protection and restoration along the edges of these canals, can significantly reduce canal-widening impacts on wetland loss. Besides the direct, uncontrollable impacts of a functioning navigation canal (e.g., saltwater intrusion), additional impacts can be mitigated with bank stabilization, and where possible, the beneficial use of dredged material (produced during maintenance dredging activities) to create wetland or upland habitats. It continues to be the responsibility of COE and the States to properly mitigate and monitor onshore infrastructure impacts.

The Federal Government does pay compensatory mitigation to Louisiana. Although there are other Federal funding sources, the following four sources specifically target wetlands loss:

- The Coastal Wetlands Planning, Protection and Restoration Act's primary focus is on the restoration and protection of Louisiana's wetlands. Louisiana restoration projects receive 70 percent of its authorized funds, with the goal being to design, build, maintain, and monitor sustainable projects that create, protect, and restore Louisiana's coastal wetlands.
- The Coastal Impact Assistance Program provides funds for the compensation of cumulative and indirect impacts from the OCS oil and gas program to coastal governments onshore of OCS oil and gas operations. Authorized uses of these funds include, among other things, projects undertaken to combat wetlands loss.
- The Gulf of Mexico Energy Security Act provides funds for the compensation of cumulative and indirect impacts from the OCS oil and gas

program. Funding is provided in the form of revenue sharing with the States of Texas, Louisiana, Mississippi, and Alabama. Authorized uses of these funds include, among other things, projects undertaken to combat wetlands loss.

- Water Resources Development Act—As discussed in Representative Melancon's speech (http://www.melancon.house.gov/index.php?option=com_content&task=view&id=759&Itemid=86), the compromise legislation includes authorization for over $3 billion in projects for south Louisiana, including full authorization for the Morganza-to-the-Gulf hurricane and storm protection system, $1.9 billion for a comprehensive Federal coastal restoration plan, closure of the Mississippi River Gulf Outlet, and $90 million to bring the Federal levees in the South Lafourche Levee District up to 100-year protection, which will offer better protection to residents in the parish and make their homes eligible for the National Flood Insurance Program.

From FY 1986 to FY 2007, Louisiana has received over $1 billion from Federal offshore 8(g) revenues. Louisiana received $23 million for FY 2007 alone. With the enactment of the Gulf of Mexico Energy Security Act of 2006 (GOMESA), Louisiana will receive a much larger share of offshore revenues. According to a January 9, 2007, press release from then Representative Bobby Jindal, it was estimated Louisiana would receive around $200 million over the first 10 years and from $650 million to $1 billion a year beginning in 2017 from GOMESA (U.S. House of Representatives, 2007). Senator Mary Landrieu stated in a December 2006 press release that, in addition to these funds, the State is expected to receive $9 billion for hurricane protection, wetlands restoration, and navigation projects in the next 10 years from the regular budget process and other previous legislation, such as CWPPRA, and CIAP (U.S. Senate, 2006). Louisiana has also received millions of dollars from the Land and Water Conservation Fund ($387,192 in FY 2008) and the National Historic Preservation Fund ($694,595 in FY 2008), which are funded 90 percent and 100 percent, respectively, by revenues generated from offshore oil and gas activities. Section 384 of the Energy Policy Act of 2005 established CIAP, which authorizes funds to be distributed to OCS oil- and gas-producing states to mitigate the impacts of OCS oil and gas activities. Under CIAP, the Secretary of the Interior is authorized to distribute to producing States and coastal political subdivisions $250 million for each of the FY 2007 through 2010. This money will be shared among Alabama, Alaska, California, Louisiana, Mississippi, and Texas and shall be used for one or more of the following purposes:

- projects and activities for the conservation, protection, or restoration of coastal areas, including wetlands;
- mitigation of damage to fish, wildlife, or natural resources;
- planning assistance and the administrative costs of complying with this section;
- implementation of a federally-approved marine, coastal, or comprehensive conservation management plan; and
- mitigation of the impact of OCS through funding or onshore infrastructure projects and public service needs.

The State of Louisiana's continued requests for MMS to "carry out compensatory mitigation to offset the loss of wetlands" and to provide direct compensatory mitigation for direct, indirect, and cumulative effects from oil and gas projects that may result from a lease sale cannot be met under current legal authority. Because there are "reasonably foreseeable coastal effects" to Louisiana's coastal zone resources and uses that may result from later activities conducted on offshore leases, MMS sends Louisiana a Consistency Determination in compliance with 15 CFR 930.39 (a) for each OCS lease sale. However, MMS is not authorized by Congress to provide compensation to Louisiana in the same manner that an applicant for a Louisiana Coastal Use permit does or as when COE is an applicant under 15 CFR 930 Subpart C. The MMS is not an "applicant" for OCS lease sale activity, as the Agency does not propose specific Federal development projects in Louisiana's coastal zone. In addition to adhering to the requirements of 15 CFR 930 Subpart C for OCS lease sales, MMS ensures proper CZMA compliance for later development decisions by fully evaluating and approving exploration and development plans and pipelines covered by 15 CFR 930 Subparts D and E, and by ensuring that all CZMA information requirements and processes are followed before issuing permits to applicants.

FLORIDA DEPARTMENT OF STATE
Kurt S. Browning
Secretary of State
DIVISION OF HISTORICAL RESOURCES

April 15, 2008

Regional Supervisor
Leasing and Environment (MS 5410)
Minerals Management Services
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

Re: Gulf of Mexico OCS Oil and Gas Lease Sales: 2009-2012
Central and Western Planning Areas
Draft Supplemental Environmental Impact Statement
DHR Project File No. 2008-2168

To Whom It May Concern:

The review of the above referenced document was carried out in accordance with the provisions of Florida's Coastal Zone Management Act and Chapter 267: the Historical Resources Act (*Florida Statutes*), as well as Section 106 of the National Historic Preservation Act of 1966 (Public Law 102-575), as amended in 1992, and 36 C.F.R., Part 800: Protection of Historic Properties. The State Historic Preservation Officer is to advise and assist federal agencies or their designees when identifying historic properties, assessing effects upon them, and considering alternatives to avoid or reduce a project's effect on them.

Because of the locations of the proposed lease sales, it is considered unlikely that Florida's historic properties will be affected. Nevertheless, provisions are in place for the identification of archaeological and historic resources, and the draft supplemental environmental impact statement addresses the requirements for historic resource surveys and the avoidance of adverse impacts. It is the opinion of this agency that historic resource concerns are adequately addressed.

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

❒ **Director's Office** (850) 245-6300 • FAX: 245-6436
❒ **Archaeological Research** (850) 245-6444 • FAX: 245-6452
✓ **Historic Preservation** (850) 245-6333 • FAX: 245-6437
❒ **Historical Museums** (850) 245-6400 • FAX: 245-6433
❒ **South Regional Office** (561) 416-2115 • FAX: 416-2149
❒ **North Regional Office** (850) 245-6445 • FAX: 245-6435
❒ **Central Regional Office** (813) 272-3843 • FAX: 272-2340

Minerals Management Service
April 15, 2008
Page 2

If you have any questions concerning our comments, please do not hesitate to contact Susan Harp at (850) 245-6333. Thank you for your interest in protecting Florida's historic resources.

Sincerely,

Frederick P. Gaske, Director, and
State Historic Preservation Officer

FDOS-1 Comment noted.

STATE OF ALABAMA
ALABAMA HISTORICAL COMMISSION
468 SOUTH PERRY STREET
MONTGOMERY, ALABAMA 36130-0900

TEL: 334-242-3184
FAX: 334-240-3477

May 1, 2008

Regional Supervisor
Leasing and Environment (MS 5410)
Call/NOI Sales 2009-2012
Minerals Management Service
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Re: AHC 06-0626
Draft Supplemental SEIS, 181 South Area
Central Planning Area
Gulf of Mexico

Dear Sir or Madam:

AHC-1

Upon review of the above referenced document, we agree that cultural resource issues associated with proposed project activities should be reviewed by this office on a project-specific basis. We also agree with the methods proposed for locating and protecting historic properties. We applaud the efforts taken by Minerals Management Service to consider their undertakings' potential impacts to Alabama's cultural resources. We look forward to working with you on upcoming projects.

We appreciate your efforts on this issue. Should you have any questions, the point of contact for this matter is Amanda Hill at (334) 230-2692. Please have the AHC tracking number referenced above available and include it with any correspondence.

Truly yours,

Elizabeth Ann Brown
Deputy State Historic Preservation Officer

EAB/AMH/amh

AHC-1 Comment noted.

ONIS "TREY" GLENN, III
DIRECTOR

ADEM
Alabama Department of Environmental Management
adem.alabama.gov
1400 Coliseum Blvd. 36110-2059 ♦ Post Office Box 301463
Montgomery, Alabama 36130-1463
(334) 271-7700
FAX (334) 271-7950

BOB RILEY
GOVERNOR

May 2, 2008

Mr. Joseph A. Christopher, Regional Supervisor
Leasing and Environment (MS 5410)
Minerals Management Service
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

RE: Response to Gulf of Mexico Outer Continental Shelf (OCS) Oil & Gas Lease Sales 2009-2012
Draft Supplemental Environmental Impact Statement (SEIS), April 2008

Dear Mr. Christopher:

Reference is made to correspondence dated April 2, 2008 from the Minerals Management Service (MMS) regarding the draft SEIS and the Service's request for written comments. We understand the Gulf of Mexico Energy Security Act of 2006 (GOMESA) (P.L. 109-432, December 20, 2006) mandates the MMS to offer the 181 South Area for oil and gas leasing. Therefore, the MMS is proposing the sale area for proposed Central Planning Area (CPA) Sales 208 (2009), 213 (2010), 216 (2011), and 222 (2012) be expanded to include 4.3 million ac of the 181 South Area. The Alabama Department of Environmental Management (ADEM) has completed its review of the draft SEIS and offers the following comments for your consideration.

ADEM-1

By letter dated April 13, 2006, Governor Bob Riley expressed the State's support for a balanced, reasonable, and environmentally sound federal leasing program. This support being contingent upon OCS activities in waters adjacent to Alabama's coast being carried out in full compliance with relevant Alabama laws, rules, and regulations and in a manner that is fully compliant and consistent with its Coastal Zone Management Program. Additionally, the ADEM has consistently supported protection for environmentally sensitive areas that might be impacted by oil and gas exploration and development activities in the OCS.

ADEM2

The ADEM also continues to recognize the Governor's opposition to leases within 15 miles of the Baldwin County, Alabama Coast of which no sales are proposed in this draft SEIS. Therefore, ADEM supports Alternative C for proposed Central Planning Area GOM Sales. Further, the ADEM request that MMS provide adequate protection for the live bottom areas, pinnacle reefs, chemosynthetic communities, and other sensitive environments in the OCS off Alabama's coast.

Call or write anytime with questions. The Department contact for this project is Allen Phelps. 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

c: Dr. Berry (Nick) H. Tew, Jr., Geological Survey of Alabama
Phillip Hinesley, ADCNR Coastal Section
Bonnie Johnson, MMS Leasing & Environment

Birmingham Branch
110 Vulcan Road
Birmingham, AL 35209-4702
(205) 942-6168
(205) 941-1603 (Fax)

Decatur Branch
2715 Sandlin Road, S. W.
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Mobile Branch
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(251) 479-2593 (Fax)

Mobile - Coastal
4171 Commanders Drive
Mobile, AL 36615-1421
(251) 432-6533
(251) 432-6598 (Fax)

ADEM-1 Comments noted.

ADEM-2 The Alabama Department of Environmental Management's support of Alternative C is noted. At the completion of the EIS/prelease process, the Assistant Secretary of the Interior for Land and Minerals (ASLM) considers conclusions of the SEIS analyses and the comments received during scoping and on the Draft and Final SEIS's. At that time, the ASLM decides which of the proposed alternatives and/or lease stipulations will be implemented.

The MMS recognizes the need to protect live-bottom areas, pinnacle and topographic features, and chemosynthetic communities. Lease stipulations and NTL's to protect these resources are included in the proposed actions evaluated in this Final SEIS.

SARASOTA COUNTY
"Dedicated to Quality Service"

BOARD OF COUNTY COMMISSIONERS
1660 Ringling Boulevard
Sarasota, Florida 34236
Telephone 941-861-5344
Fax 941-861-5987

June 13, 2008

Regional Supervisor
Leasing and Environment (MS5410)
Minerals Management Service
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Subject: **Draft Environmental Impact Statement**
Proposed Central Planning Areas 208, 213, 216 and 222; and Proposed Western Planning Area Lease Sales 210, 215, and 218

Sarasota County has reviewed the draft Environmental Impact Statement (EIS) for the proposed Central Planning Areas and would like to submit the following comments for consideration.

SC-1 While the draft EIS clearly acknowledges the fact that there is a potential for an oil spill within the Central Planning Areas, the document does not emphasize enough the adverse affects of such an oil spill. Our valuable marine environments and the wildlife depend on gulf waters and could suffer serious, perhaps catastrophic, and long-lasting harm if an accident were to occur off the coast of Florida. The draft EIS should be revised to more accurately reflect the potential harm that could be caused by an oil spill.

As a coastal community located on the eastern shore of the Gulf of Mexico, Sarasota County is very concerned with any activities that could impact the gulf's quality and health. As stated in the attached letter from the Sarasota Board of County Commissioners to the Governor of Florida, we believe that offshore drilling will compromise the integrity of Florida waters. Our community identity, economy, and culture are linked and dependent on a healthy and attractive coastal environment. Therefore, we cannot support the proposed sale of lease areas as described in the draft EIS and urge the MMS to continue to prohibit oil drilling within or directly adjacent to Florida waters.

Thank you taking the time to consider our concerns.

Sincerely,

Shannon Staub
Chair

Enclosure

c: Sarasota County Commission

BCC# 06003

SARASOTA COUNTY
"Dedicated to Quality Service"

BOARD OF COUNTY COMMISSIONERS
1660 Ringling Boulevard
Sarasota, Florida 34236
Telephone 941-861-5344
Fax 941-861-5987

February 7, 2006

The Honorable Jeb Bush
Office of the Governor
PL-05, The Capitol
Tallahassee, Florida 32399

Re: Offshore Drilling in Florida Waters

Governor Bush, for many years, the State of Florida has been under pressure to support initiatives designed to allow offshore drilling off the coast of Florida in the Gulf of Mexico. Although these efforts have been defeated, Congress is again considering whether such drilling should occur adjacent to the State of Florida.

As a coastal community located on the eastern shore of the Gulf of Mexico, Sarasota County is very concerned with any activities that could impact the gulf's quality and health. Our community identity, economy, and culture are integrally linked and dependent on a healthy and attractive coastal environment. We believe that offshore drilling will compromise the integrity of Florida waters. Our valuable marine environments and the wildlife depend on gulf waters and could suffer serious, perhaps catastrophic, and long-lasting harm if an accident were to occur off the coast of Florida. The risks of drilling are too high for our community and for the state of Florida.

It is our understanding that the Department of the Interior has prepared the "*2007-2012 Offshore Drilling Plan for the Gulf of Mexico*", which includes a proposal to give the State of Louisiana authority over portions of Florida waters. If the plan to grant authority over Lease Sale Area 181 to Louisiana is approved, it bears the potential to allow drilling in Florida waters. Such action is contrary to the consistent opposition of Floridians to oil exploration in Florida waters and will undermine our efforts to protect local waters and our coastline. We request that, on behalf of communities such as ours and resources in the state, you challenge this component of the Offshore Drilling Plan and seek to maintain Florida's right to manage its own waters in accordance with the community and environmental standards that its citizens demand.

We support Senator Mel Martinez's and Bill Nelson's bill, known as the "*Permanent Protection for Florida Act of 2006*", to permanently prohibit offshore drilling on the outer Continental Shelf off the State of Florida, including Lease Sale Area 181. This bipartisan bill proposes to protect Florida's unique environment and tourism dependent economy from the threat of offshore drilling.

Paul H. Mercier, District 1 • David R. Mills, District 2 • Shannon Staub, District 3 • Nora Patterson, District 4 • Jon Thaxton, District 5
pmercier@scgov.net dmills@scgov.net sstaub@scgov.net npatters@scgov.net jthaxton@scgov.net

Recycled Paper

The Honorable Jeb Bush
February 6, 2006
Page 2

This is an opportunity to provide long-term protections to the Gulf of Mexico and other Florida waters and to preserve Florida's landscape. We hope that the State of Florida will officially support this historic legislation and oppose any legislative activities that facilitate drilling off the coast of Florida, or that confer to another state authority over Florida waters.

Thank you for taking the time to consider our concerns.

With regards,

DAVID R. MILLS
Chairman

c: The Honorable Mel Martinez
The Honorable Bill Nelson
Sarasota Board of County Commissioners

SC-1 The CPA is >250 mi (402 km) from Sarasota County, Florida. **Figure 3-8** indicates that the risk of a spill ≥1,000 bbl occurring and contacting either the coastal waters or resources of Sarasota County within 10 days is <0.5 percent for activity resulting from the CPA, which includes the addition of the 181 South Area.

Chapters 4.1.2.1.3 and 4.1.2.2.3 describe accidental events associated with a CPA proposed action that could impact coastal and marine water quality, respectively. The effects of oil spills on environmental resources are also described throughout **Chapter 4.1**. **Chapter 3.2.1.5** provides information regarding spill response.

B.I.G.
Bayou Industrial Group

May 15, 2008

Joseph A. Christopher
Regional Supervisor
Leasing and Environment (MS5410)
Minerals Management Service
Gulf of Mexico OCS Region
1201 Elmwood Park Road
New Orleans, LA 70123-2394

Re: "Draft Environmental Impact Statement for Gulf of Mexico OCS Oil and Gas Lease Sales: 2009-2112."

Dear Mr. Christopher:

The Bayou Industrial Group (BIG), based in Thibodaux, Louisiana, represents over 100 companies and individuals in Lafourche, Terrebonne, and Assumption parishes. We thank you for allowing us to comment on the Draft Environmental Impact Statement (EIS) for Gulf of Mexico OCS Oil and Gas Lease Sales: 2009-2112. We live and work in a region that has grown to be the center of offshore oil and gas development in the central Gulf of Mexico, and believe it is important that our voices and those of other local residents and business owners be heard when national decisions stand to have very tangible impacts on our communities and infrastructure.

BIG-1

BIG supports the proposed lease sales included in this EIS in an effort to support our nation's energy needs. However, we also recognize that this activity will have significant impacts on traffic along LA 1 in southern Lafourche Parish, designated by the U.S. Congress as a High Priority Corridor for its role as critical energy infrastructure. As you must understand, without a substantial federal commitment of $250 million for Phase 2 of the LA 1 Improvement Project, this sole highway link to Port Fourchon could be lost, wreaking havoc on our national energy supply and economy. Now, more than ever, as our nation faces gasoline prices at $4 per gallon, it is so important that MMS take immediate action to mitigate the impacts of OCS activity on Lafourche parish infrastructure and secure the LA 1 Corridor.

America depends on LA 1 and Port Fourchon for 18 percent of its oil and gas supply, and perhaps no other infrastructure in America is as critical to this nation's energy economy, energy security and recovery after natural disasters than this vulnerable two-lane highway in southern Lafourche parish. Leases sales serviced out of Port Fourchon have generated more than $5 billion per year for the national treasury. If LA 1 were to be washed out for a three-week period, this nation would experience an estimated $600 million/per day in loss sales along with huge losses in family income, and substantially higher energy costs.

BIG2

It is evident that Louisiana and the working people of our coast are doing our part to keep the oil and gas flowing; however, the federal government needs to do its part to ensure the viability of the critical energy infrastructure that allows us to get the job done. MMS has not prudently, aggressively, or creatively attempted to mitigate for the existing impacts we have experienced for more than 10 years and have been recorded in numerous other Environmental Impact Studies.

Joseph A. Christopher
Regional Supervisor
Leasing and Environment (MS5410)
Minerals Management Service
Page 2

BIG-2 This region and our nation deserve prompt attention to our highway infrastructure, and at the very least, a formal response to our continued requests for mitigation.

BIG3 In addition to the LA 1 Improvement Project, BIG also asks that the MMS make note of the needed improvements to the South Lafourche Levee System and the Water Processing and Transmission System that impact Lafourche Parish's continued ability to service offshore oil and gas production in the Gulf of Mexico.

LA 1 is a workhorse for the federal government and every American, serving as the backbone of energy production and transportation. The U.S. cannot let this critical infrastructure languish. Mitigate the impacts of oil and gas activity on LA 1, and secure our levees and water supply so that our region can continue to serve this nation for decades to come.

Sincerely,

Eddie Hebert, President
Bayou Industrial Group

P.O. Box 712 Thibodaux, LA 70302 • 985/580/3901

BIG-1 See the response to Comment CHAMB-2 regarding Federal funding sources for the improvements to LA Hwy 1.

BIG-2 See the responses to Comments LA-16 and CHAMB-2. The responses contained in this Final SEIS are considered formal responses to comments submitted by interested parties.

BIG-3 The MMS has no jurisdiction over onshore development and flood control projects nor does it have the authority to require hurricane protection for coastal communities, infrastructure, or environmental resources.

Restore or Retreat

P.O. Box 2048-NSU • Thibodaux, Louisiana 70310 • (985) 448-4485 • Fax (985) 448-4486
Email: simone.maloz@nicholls.edu • www.restoreorretreat.org

May 19, 2008

Mr. Joseph Christopher
Regional Supervisor, Leasing and Environment
U.S. Minerals Management Service
GOM OCS Region
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

Re: Draft Environmental Impact Statement for GOM OCS Oil and Gas Lease Sales: 2009-2012

Dear Mr. Christopher:

On behalf of the organization Restore or Retreat, which represents over 200 diverse businesses and individuals from the Barataria and Terrebonne Basins of South Louisiana, please accept this letter as our official comment on the Draft Environmental Impact Statement for GOM OCS Oil and Gas Lease Sales: 2009-2012, which is currently being considered by your department.

Restore or Retreat is a non-profit coastal advocacy group formed by concerned stakeholders from across south Louisiana. Our membership recognizes our area is on the brink of an ecological and economical disaster because of the travesty occurring to our coast. Without proper financing and planning by the federal government, we will lose more than our coast, community, and culture; we will also lose our nation's energy security.

With seven sales in the Gulf of Mexico being considered under this multisale SEIS, you can see before and since the Deep Water Royalty Relief Act of 1995, the entire western and central Gulf Coast has been the focal area of servicing the needs of the offshore oil and gas industry. Due to Hurricane Katrina's landfall to our east and Hurricane Rita's to our west, Port Fourchon, at the point of the Barataria Basin, has become the epicenter to servicing this industry, a challenge the port has certainly has risen to. Long before the devastating hurricanes, however, there was an escalating need to restore and protect the fragile coastline which hosts the vital infrastructure needed to support this industry, especially in the most rapidly eroding Barataria and Terrebonne Basins. After years of neglect and no previous funding mechanism to pay for the mitigation of these impacts caused by the increased activity, the infrastructure and the surrounding communities, which support over 18 percent of the nation's total energy needs, remain at the mercy of Mother Nature. It is this vulnerability that threatens our national energy security.

RR-1

The people of this region are eager to feed the hunger for this economic engine; however, the time has now come to mitigate for the impacts caused by this increased activity. With Port Fourchon alone generating $5 billion/year for the national treasury, it is essential MMS immediately and specifically address impacts to sensitive coastal environments, as well as socioeconomics, for both current and future drilling prior to approving any new lease sales, a move which MMS has not done in the past. MMS is long overdue in investing in the area which it has so bountifully harvested from.

ROR MMS Comments
5/19/08
Pg. 2

RR-2

In addition to sensitive coastal environments and socioeconomic impacts, infrastructure improvements also play a vital role in our area's support of MMS OCS activity. Improvements and securitization of Louisiana Highway 1, the Larose to Golden Meadow Hurricane System, and the Water Processing and Transmission System should be appropriately underwritten to secure the community's ability to continue to service the deepwater needs of the Gulf of Mexico.

Since the first oil well near Jennings, LA, in 1901, communities throughout Louisiana, and especially along our coast, have embraced the oil and gas lifestyle. This lifestyle comes with a price, however, and we are now asking for the federal government's commitment in return for our continued support of an industry that most states are not willing to embrace. Louisianians have earned the right to be fairly and adequately compensated for being one of the few to bear the burden of the oil and gas needs of the nation.

Thank you for allowing our organization to comment on this critical plan. If you have any questions or need more information, please do not hesitate to contact our office at 985/448.4485.

Sincerely,

Simone Theriot Maloz
Executive Director

Cc: Tim Readinger, MMS Associate Director, Offshore Minerals Management
George Triebsch, MMS Associate Director, Policy and Management Improvement

Restore or Retreat

RR-1 See the response to Comment LA-10 regarding mitigation.

RR-2 See the responses to Comments LA-10, CHAMB-2, and CHAMB-4 regarding Federal funds allocated to the improvements and securitization of LA Hwy 1. In terms of compensatory mitigation for impacts to onshore infrastructure, Louisiana already receives and will receive Federal funds to mitigate these types of impacts. The State of Louisiana receives funds from Federal offshore 8(g) revenues. With the enactment of GOMESA, Louisiana will receive a much larger share of offshore revenues. Section 384 of the Energy Policy Act of 2005 established CIAP, which authorizes funds to be distributed to OCS oil- and gas-producing states to mitigate the impacts of OCS oil and gas activities. The State of Louisiana and Lafourche Parish will receive funds from this program, which may be used for the mitigation of the impacts of OCS activities through funding of onshore infrastructure projects and public service needs.

In a special session convened after the 2005 hurricanes, the Louisiana Legislature passed an amendment to the State's constitution to include hurricane protection as an additional authorized use of revenues from State mineral leases and other sources to the Wetlands Conservation and Restoration Fund. Also, the amendment dedicates any revenues shared by the Federal Government from oil and gas production on the OCS for the sole purpose "of coastal wetlands conservation, coastal restoration, hurricane protection, and infrastructure directly impacted by coastal wetland losses." This amendment was passed as Act 69 of the 1st Extraordinary Session of 2005 and was overwhelmingly ratified by the voters of Louisiana on September 30, 2006.

EARTHJUSTICE

BOZEMAN, MONTANA DENVER, COLORADO HONOLULU, HAWAI'I
INTERNATIONAL JUNEAU, ALASKA OAKLAND, CALIFORNIA
SEATTLE, WASHINGTON TALLAHASSEE, FLORIDA WASHINGTON, D.C.
ENVIRONMENTAL LAW CLINIC AT STANFORD UNIVERSITY

June 10, 2008

Via Email and United States Mail
Regional Supervisor, Leasing and Environment (MS 5410)
Minerals Management Service, Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394
Email: environment@mms.gov

Re: Gulf of Mexico OCS Oil and Gas Lease Sales: 2009-2012; Central Planning Area Sales 208, 213, 216, and 222; Western Planning Area Sales 210, 215, and 218/ Draft Supplemental Environmental Impact Statement

To Whom it May Concern:

On behalf of the Gulf Restoration Network (GRN), please accept these comments on the Draft Supplemental Environmental Impact Statement (SEIS) published on April 11, 2008 that describes seven proposed oil and gas sales in the Gulf of Mexico through 2012. The GRN is a coalition of local, regional, and national environmental and citizen organizations and numerous individuals committed to uniting and empowering people to protect and restore the natural resources of the Gulf Region for future generations.

The GRN is concerned that the SEIS fails to adequately analyze the adverse effects of oil and gas exploration and development that will be associated with these lease sales in the Gulf, particularly those effects related to seismic activity. This failure is not consistent with the requirements of the National Environmental Policy Act (NEPA) and the Outer Continental Shelf Lands Act (OCLSA).

1. Introduction

The Gulf of Mexico is an extraordinary aesthetic, economic, and environmental resource. It sustains enormous biological productivity and contains a suite of remarkably diverse habitats—from seagrass beds to oyster reefs and coral reefs. In short, the Gulf is rich in biological diversity.

The Gulf of Mexico's synergy of productivity and diversity is a tremendous economic driver for the nation as a whole and for Florida in particular. The Gulf tourist industry encompasses tens of thousands of jobs worth over $20 billion annually. The Gulf's commercial fishery produces several billion pounds of fish and shellfish annually with dockside values exceeding $990 million. Shrimp landings in the Gulf account for about 80% of the nation's total. Gulf oyster production accounts for about 60% of the national total in terms of poundage. Gulf recreational fishing generates almost 30% of U.S. saltwater fishing expenditure; 23% of U.S. saltwater recreational jobs are based in the Gulf of Mexico. The Gulf of Mexico yields more finfish, shrimp, and shellfish annually than the south- and mid-Atlantic, Chesapeake, and New England areas combined.

The Gulf of Mexico's biological diversity is one of its greatest attractions, supporting species of marine mammals, sea turtles, fish and other marine species, many of which are endangered or threatened. Indeed, of the seven baleen whale species known to occur in the Gulf of Mexico, five are listed as endangered or threatened (the blue whale, finback whale, sei whale, humpback whale and Northern right whale). Other endangered and threatened species known to occur in the Gulf of Mexico include sperm whales, West Indian manatees, Kemp's Ridley sea turtles, leatherback sea turtles, hawksbill sea turtles, smalltooth sawfish, green sea turtles, loggerhead sea turtles, and gulf sturgeon. Candidate species (those being considered for listing as endangered or threatened) in the Gulf include the sand tiger shark, Warsaw grouper and goliath grouper.

Other notable species that occur in the Gulf of Mexico include dwarf and pygmy sperm whales, Brydes whales, several species of beaked whales, Northern Gulf of Mexico stocks of bottlenose dolphins, Atlantic and pantropical spotted dolphins, striped dolphins, spinner dolphins, Clymene dolphins, Fraser's dolphins, killer whales, pygmy killer whales, Risso's dolphins, melon-headed whales, and short-finned pilot whales.

Because the Gulf is the major drainage basin—the third largest in the world – for the contiguous states, it is already stressed by pollution, nutrient loading, and other problems. Harmful algal blooms, habitat loss, invasive species, and hypoxic (low oxygen) conditions threaten the Gulf's productivity and diversity—and therefore the sustainability —of the entire Gulf ecosystem. Noise pollution—the introduction of man-made noise into the marine environment—is also an increasingly prevalent threat, one that acts both alone and in concert with other environmental stressors to further erode productivity.

On April 11, 2008, the Minerals Management Service (MMS) issued a Draft Supplemental Environmental Impact Statement (SEIS) analyzing oil and gas lease sales tentatively scheduled for 2009-2012 in the Gulf of Mexico Central Planning Area (CPA) and Western Planning Area (WPA). *See* 73 Fed. Reg. 19872 (April 11, 2008). This SEIS analyzes the potential impacts of seven oil and gas lease sales—four in the CPA and three in the WPA. The draft analysis supplements the MMS's previous analysis of those leases in the *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* (Multisale EIS).

The Gulf of Mexico Energy Security Act of 2006 required the MMS to offer, as soon as practicable, approximately 5.8 million acres located in the southeastern part of the CPA (known as "181 South Area") for oil and gas lease sale. Pub. L. 109-432, December 20, 2006. This area had previously been included in a moratorium on oil and gas leasing. The MMS is proposing to expand the sale area for proposed CPA Sales 208 (2009), 213 (2010), 216 (2011), and 222 (2012) to include the 4.3 million acres of the 181 South Area located within the U.S. Exclusive Economic Zone. The draft SEIS purports to analyze the potential environmental effects of oil and natural gas leasing, exploration, development, and production in the 181 South Area for the proposed CPA sales as well as analyze all new information available for the CPA and WPA since the publication of the Multistate EIS. We find it significantly lacking in several respects.

2. Environmental Concerns With the Use of Seismic Exploration in the Gulf of Mexico

Oil and gas exploration and production in the Gulf of Mexico OCS is extensive and expanding. The trend in this activity has been from shallower into deeper waters. According to a report issued by the MMS in May 2004, "[t]he Gulf of Mexico is now in its ninth year of sustained expansion of the deepwater frontier," an expansion of oil and gas exploration and development that "shows no sign of diminishment"[1]

Along with this expansion has come "a dramatic increase in the acquisition of 3-D seismic data."[2] To map the ocean floor, the oil and gas industry typically relies on airguns, long submersible cannons that are towed behind boats in complex arrays, firing shots of compressed air into the water about every ten seconds. The intense pulses that they produce travel down through the water column, penetrate the seafloor, and rebound to the surface where they can be recorded and analyzed. A typical seismic survey "takes place day and night and may continue for days, weeks, or months depending on the size of the survey."[3]

There are several types of seismic surveys, including 2-D seismic surveys (an older technology that results from a ship towing a single-source array), 3-D seismic surveys (a newer technology that employs two source arrays that alternate firings), and so-called 4-D surveys, or time-lapse surveys, in which surveys are repeated every six months to note changes in subsurface features over time. According to MMS, time-lapsed seismic surveys "will likely be the next significant seismic technology to be applied routinely in the deepwater GOM."[4]

The pace of seismic surveying in the Gulf of Mexico is significant and is projected to increase. According to the PEA, as many as five regional seismic surveys may be conducted at any one time in the Gulf, with more than 30 surveys conducted annually. PEA at III-23. In 2003, more than one thousand lease blocks were surveyed seismically in the GOM. *Id.* at II-20, t.II-4. In 2008, levels will be two and a half times what they were in 2003. *Id.* MMS anticipates continued high levels of seismic surveying through the year 2014, with a peak in 2011 of more than six times the number of lease blocks surveyed as in 2003. *See id.* Lease blocks typically are 4.8 kilometers on a side, so the total area represented by these numbers is substantial.

The impacts of high-intensity seismic exploration are not theoretical. A large seismic array can produce peak pressure levels higher than that of virtually any other man-made source, save explosives—over 250 decibels. This is roughly ten times louder than standing twenty feet from a Saturn V rocket at takeoff. As we discuss below, a substantial body of evidence shows that the great bursts of energy used in probing the seafloor can kill, injure, and disturb marine

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[1] Deepwater Gulf of Mexico 2004: America's Expanding Frontier at xi (MMS, May 2004).
[2] Id. at 6.
[3] Geological and Geophysical Exploration for Mineral Resources on the Gulf of Mexico Outer Continental Shelf, Final Programmatic Environmental Assessment, July 2004, at II-11 (hereinafter "PEA").
[4] Deepwater Gulf of Mexico 2004: America's Expanding Frontier at 6 (MMS, May 2004).

animals. High-intensity sounds pose a unique danger to marine organisms in part because of the critical role that acoustics play in animal behavior and in part because of the great distances and diverse range of habitat over which intense sound can propagate underwater. Under certain conditions, intense low-frequency sound can propagate over thousands of kilometers and across entire ocean basins. Even mid-frequency sound from a powerful source can spread across hundreds of square kilometers.

Where the seafloor is hard and rocky, the pulses generated by the array might be heard for thousands of miles; under certain conditions, they can reverberate in such a way as to sound nearly continuous, masking the calls of baleen whales, fish (especially groupers) and other animals that rely on the acoustic environment for breeding and survival.[5]

Scientists agree, and the publicly-available scientific literature reflects, that intense man-made underwater sound can induce a range of adverse effects in whales, dolphins and other marine wildlife, including but not limited to:

- mortality or serious injury caused by the physical impact and effect of intense sound vibrations, including hemorrhaging of tissues in lungs, air cavities, or other structures of the body;
- mortality or serious injury caused by the possible formation of nitrogen bubbles in the bloodstream, leading to embolism;
- stranding in shallow water or beaching caused by these or other effects;
- temporary or permanent loss of hearing, which impairs an animal's ability to communicate, avoid predators, and detect and capture prey;
- avoidance behavior, which can lead to abandonment of habitat or migratory pathways, energetic consequences, and disruption of mating, feeding, nursing, or migration;
- aggressive (or agonistic) behavior, which can result in injury;
- masking of biologically meaningful sounds, such as the call of predators or potential mates; and
- declines in the availability and viability of prey species, such as squid, fish and shrimp

It is well recognized that seismic surveys can seriously harm marine mammals such as whales, dolphins and manatees. In 2002, in the Gulf of California, Mexico, two beaked whales (*Ziphius cavirostris*) were found to have stranded coincident with geophysical surveys that were being conducted in the area.[6] That same year, adult humpback whales were reported to have

[5] International Whaling Commission, 2004 Report of the Scientific Committee: Annex K (reporting data on nearly continuous sound produced by seismic surveys);
[6] Hildebrand, J., "Impacts of anthropogenic sound on cetaceans," Paper submitted to the IWC Scientific Committee (2004) (SC/56/E13).

stranded in unusually high numbers along Brazil's Abrolhos Banks, where oil-and-gas surveys were being conducted.[7] Studies suggest that critically endangered western Pacific gray whales were displaced from important feeding grounds and exhibited behavioral changes in response to seismic surveys off Russia's Sakhalin Island.[8] Other marine mammal species known to be affected by airgun arrays include sperm whales, whose distribution in the northern Gulf of Mexico has been observed to change in response to seismic operations; bowhead whales, which have been shown to avoid survey vessels to a distance of more than twenty kilometers while migrating off the Alaskan coast; and harbor porpoises, which have been seen to engage in dramatic avoidance responses.[9]

Based on this and other evidence, the Scientific Committee of the International Whaling Commission, one of the world's leading bodies of marine biologists, concluded in its 2004 report that the increase in noise from geophysical exploration and other activities was "cause for serious concern."[10]

Seismic surveys also significantly impact fish, including commercially targeted (or important) fish, and have been shown to decrease catch rates. In Norway, for example, catch rates of cod and haddock fell dramatically (between 45 and 70%) in the vicinity of an airgun array, affecting fishermen across an area nearly 5000 square kilometers in size, and did not recover within five days after operations ended.[11] Another series of studies demonstrated that airguns can cause extensive and apparently irreversible damage to the inner ears of pink snapper – damage severe enough to compromise survival – even at exposure levels that might occur several kilometers from a source.[12] Studies are just beginning on the effects on fishes and other organisms that depend on sound production in territory defense and finding mates.

Seismic surveys are also known to affect sea turtles. Loggerhead turtles have been shown to alter their swimming in response to airgun noise, and there is concern that intense noise may drive them and other species to the surface, where they are more vulnerable to ship strikes,

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[7] Engel, M.H., M.C.C. Marcondes, C.C.A. Martins, F. O Luna, R.P. Lima, and A. Campos, "Are seismic surveys responsible for cetacean strandings? An unusual mortality of adult humpback whales in Abrolhos Bank, Northeastern coast of Brazil," Paper submitted to the IWC Scientific Committee (2004) (SC/56/E28).
[8] *See* Würsig, B., D.W. Weller, A.M. Burdin, S.A. Blokhin, S.H. Reeve, A.L. Bradford, R.L. Brownell, Jr., "Gray whales summering off Sakhalin Island, Far East Russia: July-October 1997, A joint U.S.-Russian scientific investigation," Final contact report to Sakhalin Energy Investment Company (1999); Weller, D.W., A.M. Burdin, B. Würsig, B.L. Taylor, and R.L. Brownell, Jr., "The western Pacific gray whale: A review of past exploitation, current status and potential threats," *J. Cetacean Res. Manage*. 4 (2002): pp. 7-12.
[9] *See, e.g.*, Mate, B.R., K.M. Stafford, and D.K. Ljungblad, "A change in sperm whale (*Physeter macrocephalus*) distribution correlated to seismic surveys in the Gulf of Mexico," *J. Acoustical Soc. Am.* 96 (1994): pp. 3268-69 (sperm whales); Richardson, W.J. ed., "Marine Mammal and Acoustical Monitoring of Western Geophysical's Open-Water Seismic Program in the Alaskan Beaufort Sea, 1998" (1999) (LGL Rep. TA2230-3) (bowhead whales); Malme et al., "Investigations of the potential effects of underwater noise from petroleum industry activities on migrating gray whale behavior," (1983) (BBN Rep 5366) (gray whales); pers. comm. with Dr. David Bain, U. Washington (Nov. 10, 2003) (harbor porpoises).
[10] International Whaling Commission, 2004 Report of the Scientific Committee (2004): Chairman's Summary.
[11] Engås, A., S. Løkkeborg, E. Ona, and A.V. Soldal, "Effects of seismic shooting on local abundance and catch rates of cod (Gadus morhua) and haddock (Melanogrammus aeglefinus)," *Canadian J. Fish. Aquatic Sci.* 53 (1996): pp. 2238-49.
[12] McCauley, R., J. Fewtrell, and A.N. Popper, "High intensity anthropogenic sound damages fish ears," *J. Acoustical Soc. Am.* 113 (2003): pp. 638-42; *see also* McCauley et al., "Marine seismic surveys."

predation, and fishing. *See* Multistate EIS, at 40115. Given their swimming patterns, the amount of time they spend underwater, and the difficulty of spotting them from the deck of a seismic ship, it is also feared that these species would be exposed to the highest levels of sound.[13] In January-February 2004, over thirty endangered sea turtles washed up on the beaches of the Yucatán following seismic testing conducted by PEMEX, suggesting that, like marine mammals and other species, sea turtles are driven to strand by intense anthropogenic sound.[14]

Seismic surveys may also be capable of killing and injuring giant squid and other invertebrates. According to one current study, two separate strandings of multiple giant squid off the coast of Spain appear to be linked spatially and temporally to the use of airguns nearby; the squid showed lesions that have never before been seen in the species.[15] A preliminary report out of Canada suggests that airguns can physically injure snow crabs.[16]

Many of the species known to be affected by intense ocean noise reside in the Gulf of Mexico and are likely suffering harm from the intense and increasing seismic survey activity there. For example, sperm whales (an endangered species) occur in the Gulf of Mexico throughout the year, and are believed to be particularly sensitive to low-frequency, impulsive sounds.[17]

3. Comments on the Draft SEIS

a. Opening the 181 South Area may lead to an increase in seismic activity that is not discussed in the draft SEIS

As noted above, prior to the Gulf of Mexico Energy Security Act of 2006, the 181 South Area was protected from oil and gas leasing activity by a presidential moratorium. As such, "limited geophysical seismic data exist for the 181 South Area." Draft SEIS at 3-5.

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[13] Lenhardt, M.L., "Seismic and very low frequency sound-induced behaviors in captive loggerhead marine turtles (*Caretta caretta*)," in *Proceedings, Fourteenth Annual Symposium on Sea Turtle Biology and Conservation* (1994) (NOAA Tech. Memo. NMFS-SEFSC-351); McCauley, R., J. Fewtrell, A.J. Duncan, C. Jenner, M.-N. Jenner, J.D. Penrose, R.I.T. Prince, A. Adhitya, J. Murdoch, and K. McCabe, "Marine seismic surveys: Analysis and propagation of air-gun signals, and effects of air-gun exposure on humpback whales, sea turtles, fishes and squid" (2000) (Curtin University Centre for Marine Science and Technology Report R99-15); O'Hara, J. and J.R. Wilcox, "Avoidance responses of loggerhead turtles, *Caretta caretta*, to low-frequency sounds," *Copeia* (1990): pp. 564-67.

[14] Secretaria de Medio Ambiente y Recursos Natuales, Direccion General de Vida Silvestre, Delegacion Federal en Campeche, "Relaciòn de tortugas varadas en la costa de Campeche del 20 de Diciembre de 2003 al 12 de Febrero de 2004" (2004) (chart documenting strandings).

[15] Guerra, A., A.F. Gonzalez and F. Rocha, "A review of records of giant squid in the north-eastern Atlantic and severe injuries in Architeuthis dux stranded after acoustic exploration," Abstract and Presentation to the Annual Science Conference of the International Council for the Exploration of the Sea (2004).

[16] The study, which was led by the Canadian Department of Fisheries and Oceans, placed hundreds of crabs in modified lobster traps in order to observe the effects of two blasts of a seismic airgun at noise levels significantly lower than those typically generated by the seismic industry. Although differences in the control and test environments make further study necessary, researchers observed damage (including hemorrhaging and membrane detachment) in the crabs' livers and ovaries and developmental delays in their larvae. Fisheries and Oceans Canada, "Potential impacts of seismic energy on snow crab" (Sept. 2004) (Draft Habitat Status Report).

[17] *NOAA*, *Marine Mammal Stock Assessment* (2002). For a review of research on the impacts of ocean noise on sperm whales, *see*, *e.g.*, NMFS, Southeast Regional Office, Biological Opinion for Gulf of Mexico Outer Continental Shelf Lease Sale 184 at 37-40 (2002) (F/SER/2002/00145).

However, with the advent of oil and gas lease sales in this area, MMS predicts that there will be an increase of seismic activity in this area:

> The MMS recently received an application to conduct a 3D survey in the Lloyd Ridge Area (northern half of the 181 South Area). If approved, the survey would take about 1 year for acquisition and 6 months for processing. One to two 3D surveys are projected in the 181 South Area. The availability of the 181 South Area for leasing may encourage surveys of other adjacent areas of the CPA and EPA.

EJ-1

Id. Given the relatively untouched nature of the 181 South Area, GRN is concerned that this influx of activity may be particularly destructive. The MMS has failed to discuss in a meaningful way the impacts of the increase in seismic activity in the 181 South Area. This failure runs afoul of both NEPA and the OCSLA.

NEPA requires the MMS to discuss the direct and indirect effects of these lease sales – including off-site impacts – in sufficient detail to alert both its own officials and the public to environmental consequences. *See Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 339 (1989); *accord Baltimore Gas & Electric Co. v. NRDC*, 462 U.S. 87, 97 (1983). Moreover, to the extent the MMS believes that information on possible increased seismic activity is either incomplete or unavailable, the Council on Environmental Quality regulations implementing NEPA require the MMS to: (1) explicitly acknowledge the status of such information; (2) state the relevance of that information; (3) summarize existing credible scientific evidence relevant to its evaluation of reasonably foreseeable impacts of seismic activity; and (4) analyze those impacts based upon either theoretical approaches or on generally accepted scientific methods. evaluate carefully the possible environmental effects of possible increased seismic activity associated with these leases 40 C.F.R. § 1502.22(b). The SEIS simply fails to comport with these requirements.

Similarly, the OCSLA requires the MMS to consider the "environmental sensitivity and marine productivity" of the area to be affected by these lease sales. See 43 U.S. C. § 1344(a)(2). The OCSLA also directs the MMS to evaluate "relevant environmental and predictive information" when assessing the effects of these sales. *Id.* The failure of the SEIS to provide any meaningful discussion of the effects of possible seismic activity associated with these leases therefore also runs afoul of the OCSLA.

b. Further Discussion of the Impacts of the Proposed Action on the "Important Leatherback Habitat" in the 181 South Area is Necessary

We are concerned that the proposed activity will have significant impacts on the endangered leatherback sea turtle. The MMS notes that

> Routine activities resulting from a CPA or WPA proposed action have the potential to harm sea turtles. These animals could be impacted by the degradation of water quality resulting from operational discharges; noise generated by seismic exploration, helicopter and vessel traffic, platforms, and drillships; vessel collisions; and marine debris generated

by service vessels and OCS facilities. These impacts are similar in the 181 South Area as they are to the rest of the sale area.

EJ-2

Draft SEIS at 4-101. However, elsewhere in the draft SEIS, MMS distinguishes the 181 South Area by stating that that area "appears to be an important habitat for leatherbacks." *Id.* at 4-95. This statement on its face calls into question the unsupported conclusion that impacts of activity associated with these leases would be "similar" in the 181 South Area to the impacts in the other lease areas. At a minimum, NEPA requires the MMS to further explain itself in order to show how it purports to reconcile its conclusion that the impacts of oil and gas activities in the 181 South Area are "similar" to the rest of the sale area with its finding that the 181 South Area is important habitat for leatherbacks.

c. Further Discussion of the Impact of the Loop Current on Potential Oil and Gas Spills is Necessary

EJ-3

MMS explains "circulation in the 181 South Area and adjacent regions, is highly influenced by the Loop Current, a circulatory feature of the southeastern Gulf of Mexico." Draft SEIS at 3-42. However, the draft SEIS fails to address the propensity of this powerful ocean current to rapidly transport any oil spill in the 181 South Area to the west coastal area of Florida, or through the Florida Keys and onto the shores of Florida's Atlantic Coast. We are very concerned about the potential impacts of spills in the 181 South Area and do not feel that the draft SEIS's discussion can be complete without an analysis of the impact of the Loop Current in transporting pollution from this Area to other parts of the Gulf and possibly the Atlantic.

EJ-4

For example, GRN is concerned that pollution associated with oil and gas exploration and development in the 181 South Area could be transported directly into an area of the eastern Gulf of Mexico that is nourished by outflow from the Apalachicola River. The area in the Gulf of Mexico affected by the Apalachicola flow has been identified by scientists as one of the most biologically diverse and productive regions in the United States. The river is linked by nutrients to the living marine resources of this area, and has significant influences far offshore which, if disrupted, could potentially cause declines in recreational and commercial fishing as well as undermine the entire food web in this portion of the Gulf of Mexico. The SEIS entirely fails to identify this possibility, much less to analyze its potential environmental effects, to discuss mitigation, or to develop and describe alternatives that would help to avoid or minimize the adverse effects of pollution on this vital area of the Gulf. These failures plainly violate both NEPA and the OCSLA. *See, e.g.*, Robertson v. Methow Valley Citizens Council, 490 U.S. 332, 339 (1989); *Natural Resources Defense Council, Inc. v. Hodel*, 865 F.2d 288, 300 (D.C. Cir. 1988).

We thank you for your consideration of these comments, and we respectfully request that you revise the April 11, 2008 Draft SEIS to ensure that it complies fully with NEPA and the OCSLA.

Very truly yours,

Katherine D. Renshaw
Stephen E. Roady
Earthjustice
Counsel for Gulf Restoration Network

Cynthia Sarthou
Executive Director
Gulf Restoration Network

EJ-1 The 181 South Area, along with certain other areas, were previously placed off limits for oil and gas leasing through a series of moratoria dating back to June 26, 1990. The GOMESA repealed the moratoria on the 181 South Area. Under the moratoria, no funds could be expended by the Department of the Interior to conduct offshore oil and gas leasing and related activities, but the moratoria did not prohibit the acquisition of geophysical data by oil and gas operators, and seismic surveys have been ongoing in the area. Since 2000, MMS has issued five 2D permits for seismic surveys totaling 37,000 mi^2 (95,830 km^2) and three 3D seismic surveys totaling 420 OCS blocks (3,780 mi^2; 9,790 km^2) within the 181 South Area. The potential impacts of seismic surveys on environmental resources within the 181 South Area are discussed throughout **Chapter 4.1** of this SEIS.

Chapter 4.1.6.4 describes the cumulative impacts on marine mammals. Seismic exploration is an integral part of oil and gas discovery, development, and production in the Gulf of Mexico. With technical advances that now allow the extraction of petroleum from the ultra-deep areas of the Gulf of Mexico, seismic surveys are routinely conducted in virtually all water depths in the Gulf of Mexico. Noise and acoustic disturbance have been topics of great debate in the last several years, and there is general agreement that the use of sonar, particularly by the military, has in some cases been associated with impacts to certain species of marine mammals in recent years. Current research by MMS and partners did not detect avoidance of seismic vessels or airguns by sperm whales. Although that finding (or lack of finding) could be interpreted several ways, it is likely that the whales, which appear to generally remain in the northern Gulf of Mexico year-round, are habituated to seismic operations. Over the long term, stress to a population could cause very significant adverse effects, including disease, reproductive failure, and population decline. However, the proposed Protected Species Lease Stipulation and the several mitigations, including onboard observers and airgun shut-downs for whales in the exclusion zone, included in NTL 2007-G02 ("Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program"), minimize the potential of harm from seismic operations to marine mammals.

EJ-2 The statement that the 181 South Area "appears to be an important habitat for leatherbacks" is not intended to infer that certain other portions of the sale area are not equally as important. The 181 South Area is no more important leatherback habitat than much of the rest of the sale area. Leatherbacks are widely distributed in slope waters with the majority of the sightings occurring just north of DeSoto Canyon in the vicinity of the EPA shelf (Mullin and Hoggard, 2000). DeSoto Canyon is north of the 181 South Area. A similar statement is present on page 4-96 of the Draft SEIS:

The leatherback is the most abundant sea turtle in waters over the northern Gulf of Mexico continental slope (Mullin and Hoggard, 2000). Leatherbacks appear to spatially use both continental shelf and slope habitats in the Gulf of Mexico (Fritts et al., 1983b; Collard, 1990; Davis and Fargion, 1996). Surveys suggest that the region from Mississippi Canyon to DeSoto Canyon, especially near the shelf edge, which is north of the 181 South Area, appears to be an important habitat for leatherbacks (Mullin and Hoggard, 2000). Leatherbacks have been frequently sighted in the Gulf of Mexico during both summer and winter (Mullin and Hoggard, 2000).

EJ-3 The Oil Spill Risk Analysis (OSRA) conducted for the SEIS did analyze the impact of the LOOP Current in transporting pollution to all coastal areas within the Gulf of Mexico, including areas of South Florida. The results of this analysis are depicted on **Figure 3-8** and indicate that the risk of an oil spill ≥1,000 bbl occurring and contacting the South Florida resources within 10 days is <0.5 percent for activity resulting from the CPA, which includes the addition of the 181South Area. The risk of an oil spill ≥1,000 bbl occurring and contacting Florida's Atlantic Coast would also be <0.5 percent.

EJ-4 The SEIS does not fail to assess the potential for a spill to enter the area of the Eastern Gulf of Mexico that is nourished by the Apalachicola River. Page 4-10 discusses water quality in estuaries extending from the Rio Grande River to Florida Bay. The location of the Apalachicola River is depicted on **Figure 4-1** of this Final SEIS. Additionally, page 3-27 states that the addition of the 181 South Area would cause a negligible increase, if any, in the risk of an offshore spill ≥1,000 bbl occurring and contacting environmental resources (**Figures 3-6 through 3-11**).

Figure 3-8 indicates that the risk of an oil spill ≥1,000 bbl occurring and contacting either the Florida Panhandle or Florida Peninsula offshore waters within 10 days is <0.5 percent for activity resulting from the CPA, which includes the addition of the 181 South Area. The boundaries used in the OSRA analysis for the Florida Panhandle and Florida Peninsula offshore waters include the offshore area that is nourished by the Apalachicola River.

the chamber of lafourche and the bayou region, inc.

Joseph A. Christopher
Regional Supervisor
Leasing and Environment
Minerals Management
Gulf of Mexico OCS Region
1201 Elmwood Park Road
New Orleans, LA 70123-2394

June 10, 2008

Dear Mr. Christopher

The Chamber of Lafourche & the Bayou Region is an organization made up of businesses and individuals throughout Lafourche Parish and the Bayou Region. Business and individuals committed to our region. MMS Environmental Impact Statements identify five steps for mitigation measures: Avoidance, Minimization, Restoration, Maintenance, and Compensation. After ten years of documenting these impacts at your public hearings, I cannot tell you that MMS has acted on them. Are we in the avoidance category?

CHAMB-1

While our community has been supportive of a very aggressive MMS federal lease policy in the Gulf of Mexico, we have not seen the Minerals Management Service being prudent in mitigating the negative socio-economical impacts that have been experienced by our community, which is hosting the majority of this activity.

Leases sales serviced out of Port Fourchon have generated in excess of $5 billion/yr. for the national treasury. While our state will receive royalties on the leases we comment on today, MMS has not prudently, aggressively, or creatively attempted to mitigate for the existing impacts we have experienced for some 10+ years, on existing leases, and which requests have been recorded in numerous other Environmental Impact Studies. We want action on our comments – not federal stagnation. We need MMS to step out of their shell, and bring to the President and the US Congress attention that their lease sales are bringing upon the host community some very burdensome and unsafe impacts. We have seen our highways listed increasingly on the state's "Abnormal Crash Rating" reports. Minimally, the federal government should invest $250 million in the Golden Meadow to Leeville segment of needed elevated highway. That's equivalent to 16 hours of Iraq War funding – that's it - to deal with major vulnerability to this nation's energy security.

the chamber of lafourche and the bayou region, inc.
P.O. Box [illegible] Larose, Louisiana 70373-1462 Telephone: [illegible] Fax: [illegible]
[illegible]

CHAMB-2 We feel numerous citizens, organizations, and government bodies offered a remedy to MMS stalling on the mitigation of past documented impacts. By suggesting MMS place a lease stipulation over all six Central Planning Area Lease Sales and the Western Planning Area Lease Sales which are serviced by Port Fourchon and Grand Isle, effectively, a fee would be collected strictly for mitigation measures to deliver such funds to the Federal Highway Administration (FHWA) earmarked to fund mitigation measures for LA 1, in particular the $250 million needed to complete the northern elevated portions of the LA Project. However, MMS response was lighthearted regarding this serious situation, with a two sentence reply stating that MMS did not have regulatory authority to assess fees for compensatory mitigation. There was no sincere effort by MMS to work with the community on changing law that would allow for this, yet MMS noted in the Draft EIS that in other situations it has addressed incorporating identified mitigating measures into OCS operations through cooperative endeavor agreements or efforts with industry. Why has there not been a serious initiative to mitigate LA 1 impacts with a community that has been a long-term, vital partner to MMS growth policies, on impacts that have been recorded for years in numerous MMS documents?

CHAMB-3 Finally, MMS should support securitization of this corridor, not only to efficiently access the Federal leases, but to play their intellectual role within a needed federal energy policy to provide greater energy security to the nation. If LA 1 were to be washed out for a three week period, it would cause this nation in excess of $600 million/per day in loss sales alongside huge losses in family income, and more drastic, job losses in excess of 50,000.

Besides our highways, we need critical infrastructure improvements to our South Lafourche Levee System and our Water Processing & Transmission System to be appropriately underwritten to secure the community's ability to continue the needed servicing of the Deepwater Gulf of Mexico.

Don't let the results of this hearing be no action; we need the Minerals Management Service to be proactive!

Sincerely,

Lin Kiger
President & CEO

the chamber of lafourche and the bayou region, inc.
P.O. Box 1462 Larose, Louisiana 70373-1462 Telephone: (985) 693-6700 Fax: (985) 693-6702

CHAMB-1 See the responses to Comments LA-3 and LA-16. The Coastal Impact Assistance Program (CIAP) can be and is being used to mitigate socioeconomic impacts. On April 14, 2008, Senator Mary Landrieu announced that an $8.8 million MMS grant through CIAP was secured to Louisiana for improvements to a 5-mile stretch of LA Hwy 1. The total CIAP funding for the project is $35,161,080 ($33,000,000 from the State of Louisiana and $2,161,080 from Lafourche Parish). The State's CIAP funding will consist of $8,760,911 of FY 2007 allocations, $15,939,089 of FY 2008 allocations, and $8,300,000 of FY 2009 allocations. The Parish's CIAP funding will consist of $540,270 of FY 2007, 2008, 2009, and 2010 allocations. In addition, there are three non-CIAP funding sources for this project: $46,756,000 of Federal Formula (advanced construction) funds; $67,900,000 of Federal earmark (SAFETEA-LU) funds; and $1,500,000 from a NOAA grant.

CHAMB-2 The MMS requested an opinion from the Department of the Interior, Office of the Solicitor (SOL), regarding MMS's authority to collect fees from OCS leaseholders and operators for use in mitigating onshore impacts of OCS activities. The SOL determined that MMS does not have the regulatory authority to assess fees for compensatory mitigation, nor has it had this authority in the past. Unless Congress specifically earmarks funds for such purposes (e.g., Gulf of Mexico Energy Security Act of 2006 (revenue sharing), Energy Policy Act of 2005 (CIAP funding), Land and Water Conservation Fund, and the National Historic Preservation Fund), revenue collected by MMS must go to the general fund.

CHAMB-3 See the response to Comment CHAMB-2 regarding existing Federal funds allocated to the construction of LA Hwy 1. Construction of the new LA Hwy 1 system will replace the antiquated existing highway with a more progressive highway which will provide a secure corridor for the direct, safe access to Port Fourchon.

The MMS has no jurisdiction over onshore development and flood control projects nor does it have the authority to require hurricane protection for coastal communities, infrastructure or environmental resources. See the response to Comment RorR-2 regarding mitigation of the impacts of OCS activities through funding of onshore infrastructure projects and public service needs.

James C Faulk Jr.
284 east 39th
Cut Off La. 70345

I have been a resident of the Lower Lafourche for 60 + yrs. I also work in the Federal waters off the La. Coast for 40 + yrs.

The MMS has certainly impacted the offshore oil industry. Over the years safety of personnel and environmental conditions has improved thanks to the MMS.

FAULK-1

While attending a meeting at the Larose Civic Center concerning upcoming lease sales. I had the feeling that this meeting was only lip service. The personnel presenting the meeting were certainly helpful but I felt the only interested parties were local personal making a plea for help in maintaining our roads and levies. The roads are certainly impacted by traffic serving the deep-water offshore oil industry. Large trucks as well as vechilure traffic continue to pound both state and local roads to shreds. These same roads are also being impacted by rising tides due to coastal erosion.

Protection of the coast is vital to not only the Offshore Oil industry and residents of southern Louisiana, but the nation as a whole. South Louisiana ships a large percentage of hydrocarbons and sea food to the rest of the nation we are also used to import and export tons of food and equipment via the Mississippi river and connecting waterways. (i.e. the intercostals canal.) Erosion of the coast threatens these vital links, if lost to the Gulf the rest of the nation will also be impacted.

If you as a Government entity want to improve relations play a more visible roll and be viewed as an asset rather than a liability. I strongly suggest that the MMS work with Local and other Federal Agencies to protect the southern coastline of the United States.

Thanks for giving citizens the opportunity to express our views and vent some frustrations about our social and economic situations.

J C Faulk Jr

FAULK-1 Thank you for your comment.

limits may be set on oral testimony to allow time for all speakers to participate. Written statements submitted at a hearing will be considered part of the hearing record. If you are unable to attend the hearings, you may submit written comments.

Federal, State, and local governmental agencies, and other interested parties are requested to send their written comments on the Draft SEIS in one of the following two ways:

1. In written form enclosed in an envelope labeled "Comments on the Supplemental EIS" and mailed (or hand carried) to the Regional Supervisor, Leasing and Environment (MS 5410), Minerals Management Service, Gulf of Mexico OCS Region, 1201 Elmwood Park Boulevard, New Orleans, Louisiana 70123-2394.
2. Electronically to the MMS e-mail address: environment@mms.gov.

Comments on the ~~Draft~~ SEIS and are due by June 10, 2008.

GOLDBERG-1

Please
Quit encroaching into the Gulf of Mexico.
We need our beaches that are white sand & quartz & not smelling of oil like the ones in California.

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U.S. DEPARTMENT OF THE INTERIOR
MINERALS MANAGEMENT SERVICE
Gulf of Mexico OCS Region (MS 5410)
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New Orleans, LA 70123-2394

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Once they are gone, so are our tourists.

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3763 GLEN OAKS MANOR DRIVE
SARASOTA, FL 34232

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GOLDBERG-1 Comment noted.

CHAPTER 6

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CHAPTER 7

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7. PREPARERS

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APPENDICES

APPENDIX A

FIGURES

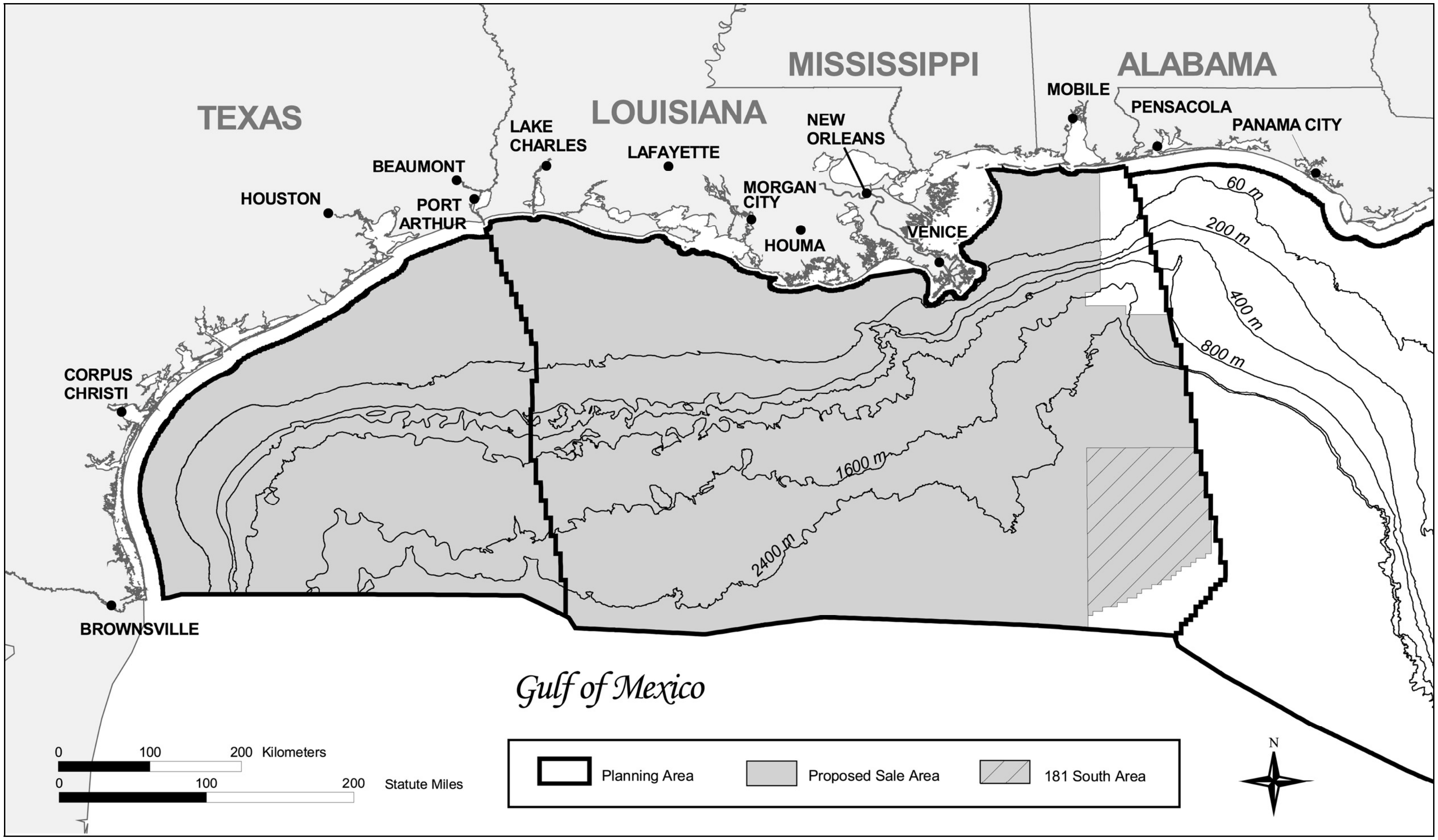

Figure 1-1. Gulf of Mexico Outer Continental Shelf Planning Areas, Proposed Lease Sale Areas, the 181 South Area, and Locations of Major Cities.

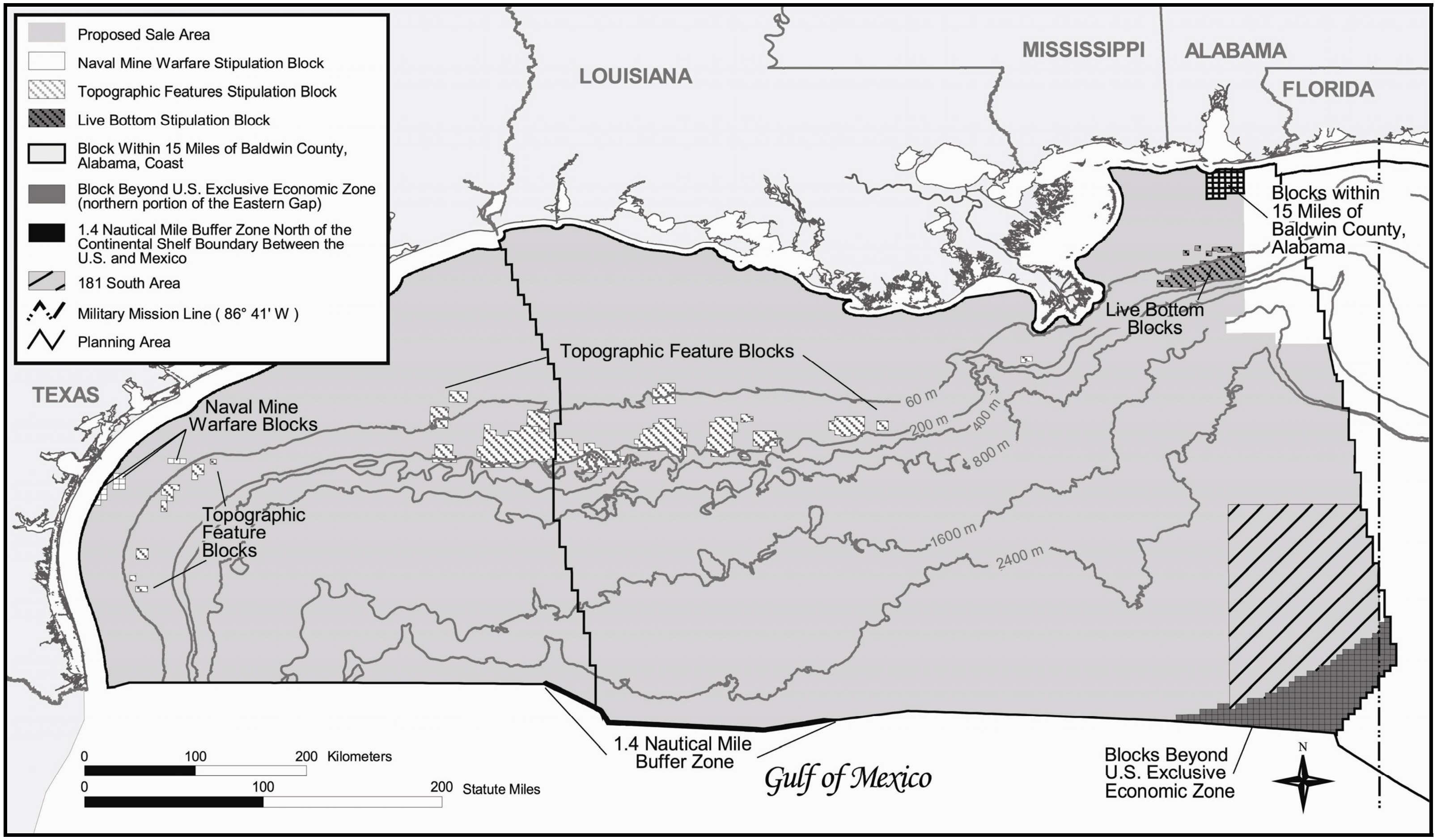

Figure 2-1. Location of Proposed Stipulations and Deferrals.

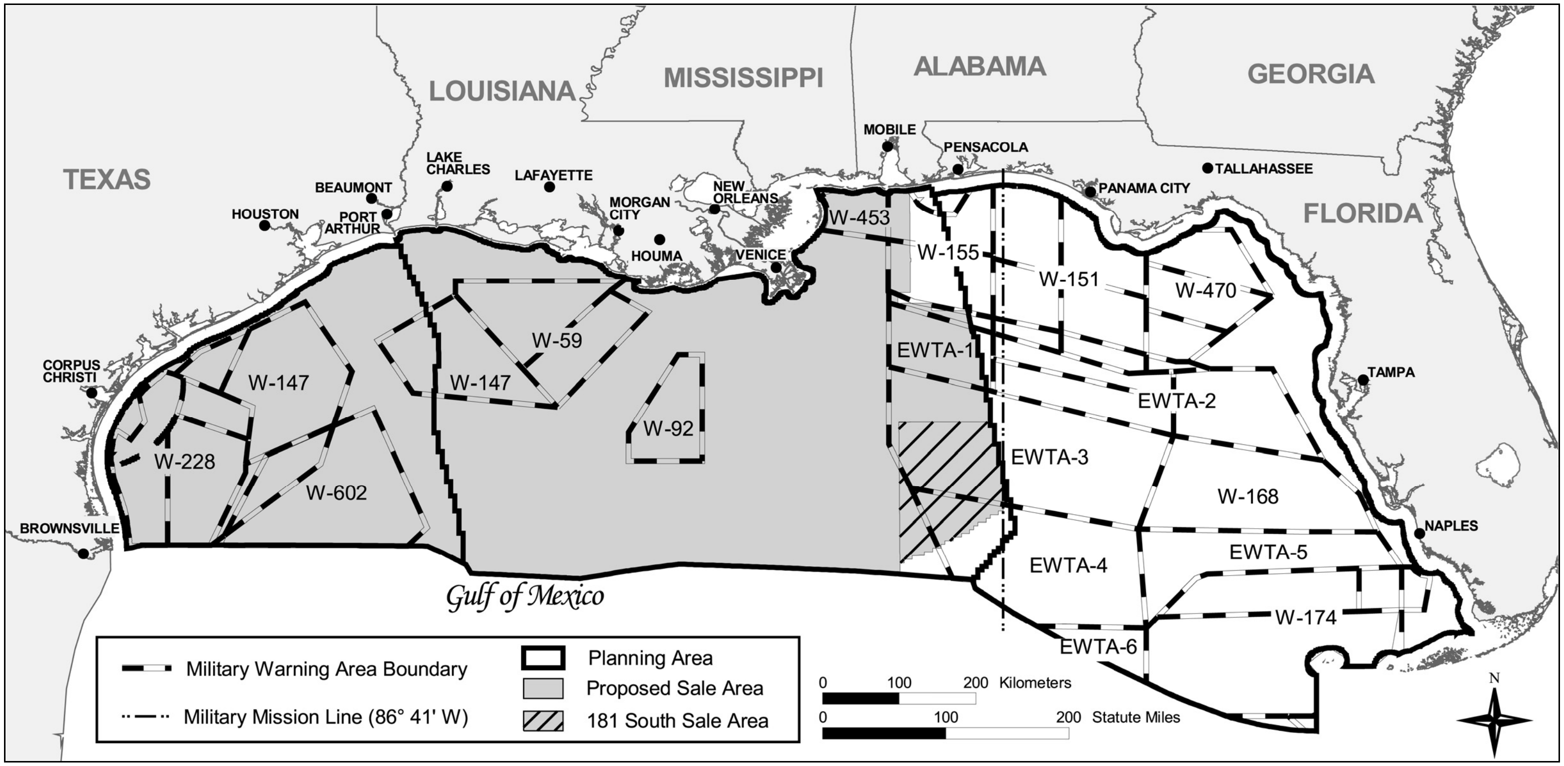

Figure 2-2. Military Warning Areas in the Gulf of Mexico.

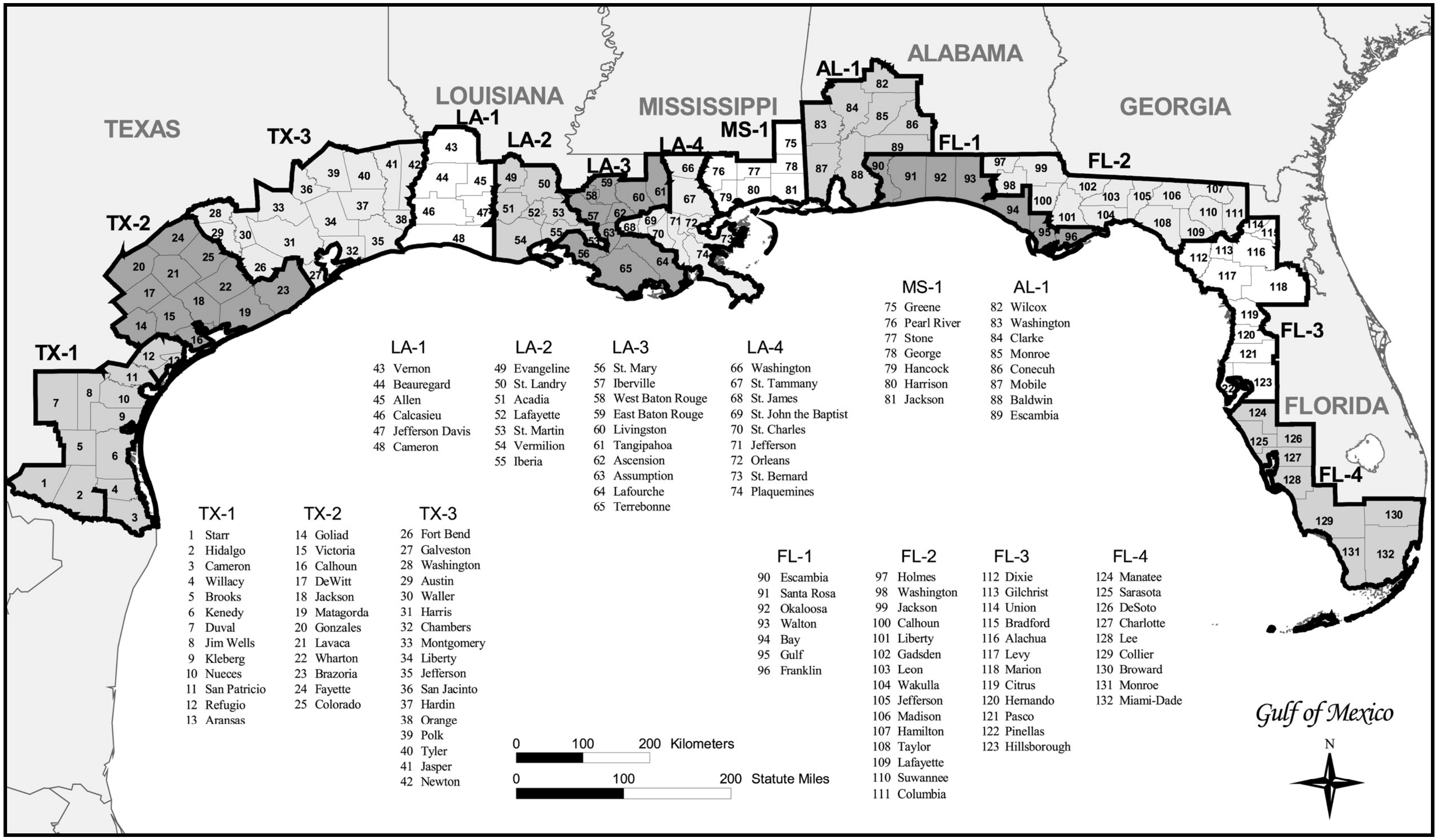

Figure 2-3. Economic Impact Areas in the Gulf of Mexico.

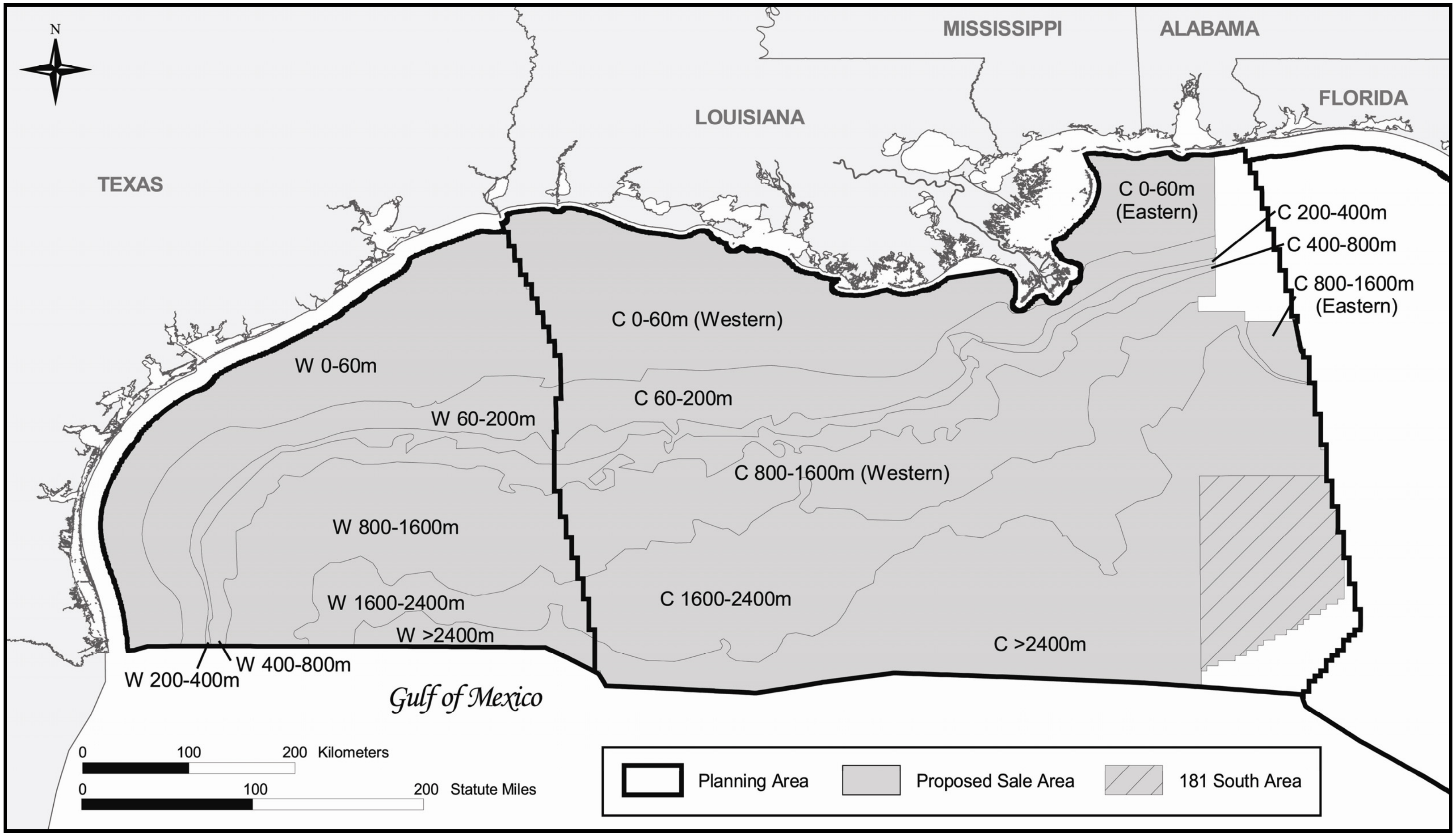

Figure 3-1. Offshore Subareas in the Gulf of Mexico.

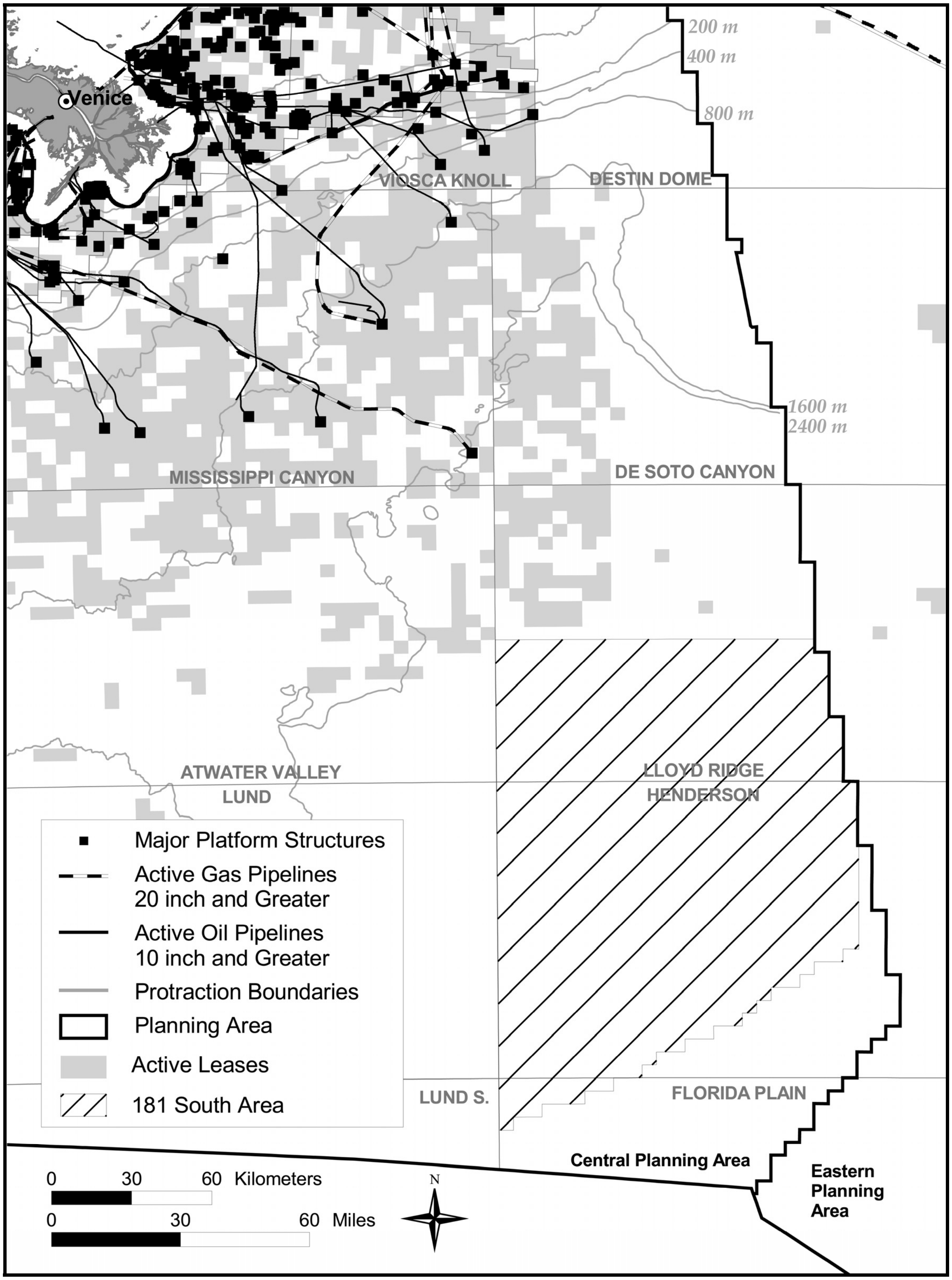

Figure 3-2. Leasing Activity and Infrastructure Near the 181 South Area.

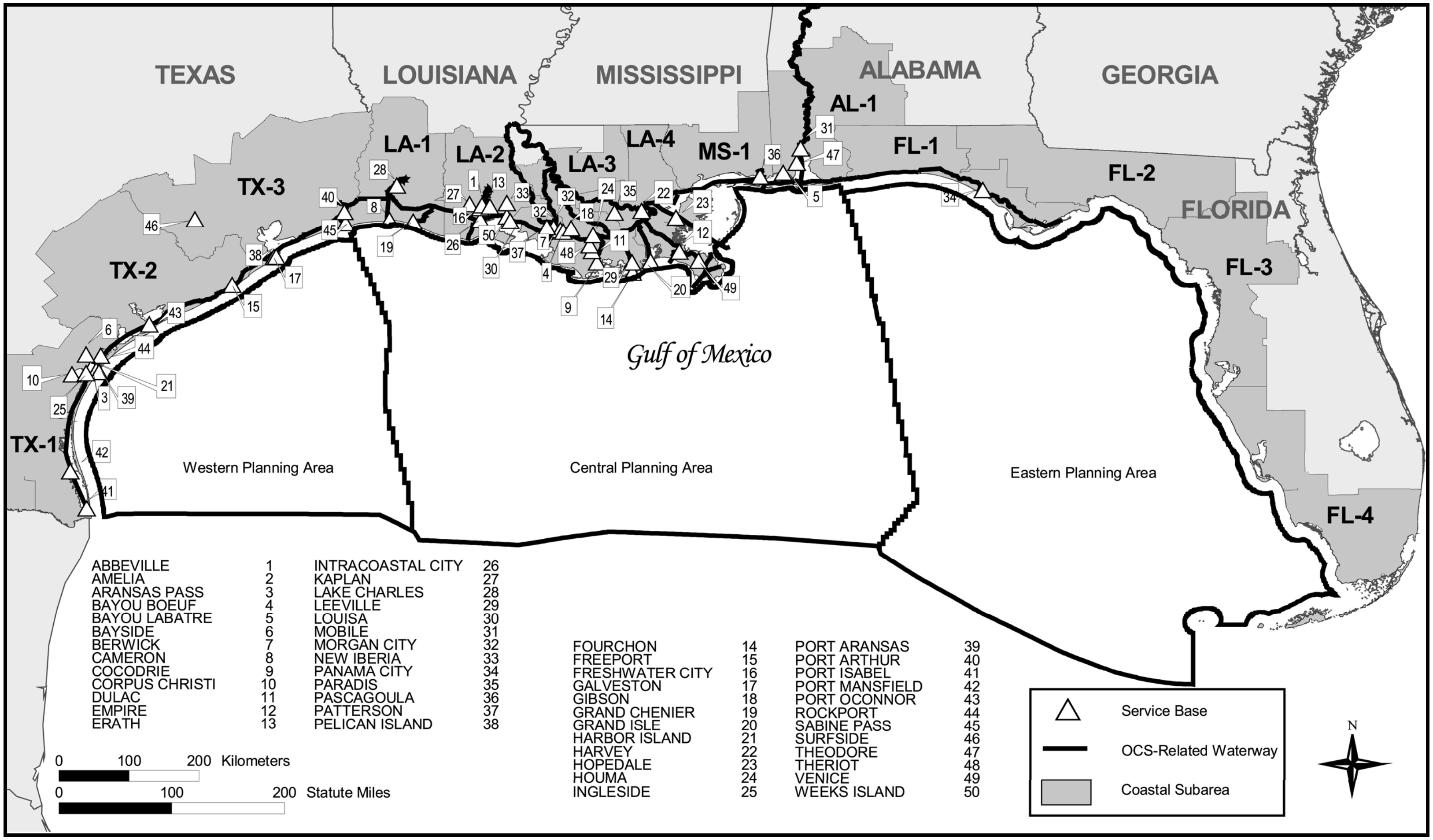

Figure 3-3. OCS-Related Service Bases in the Gulf of Mexico.

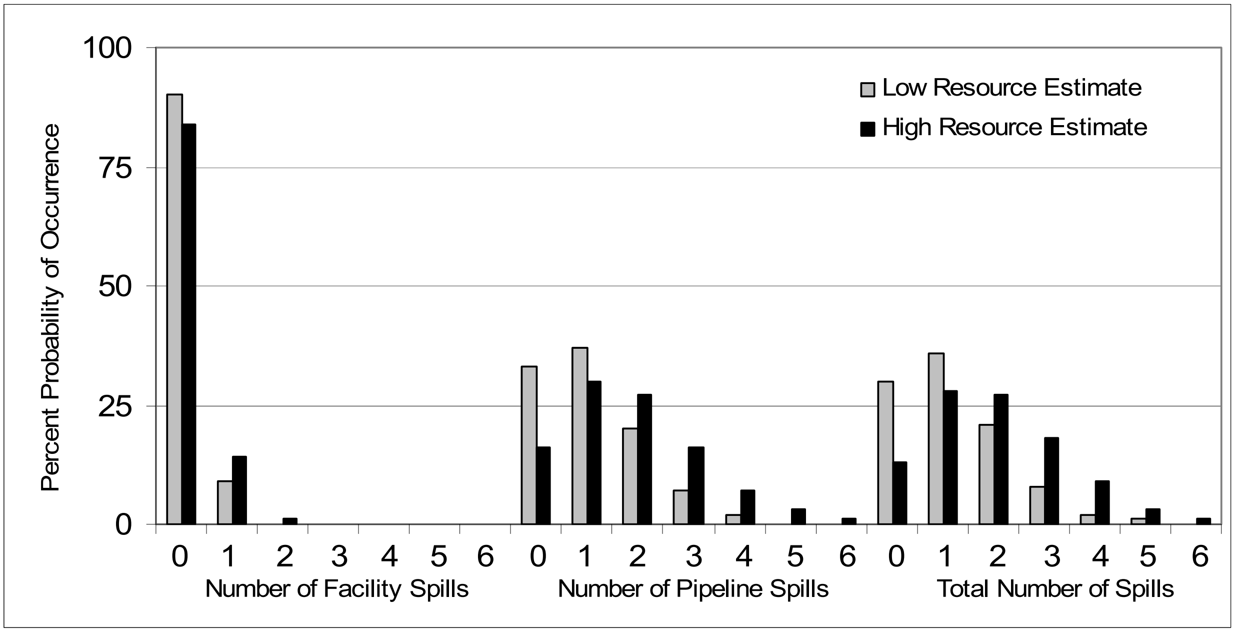

Figure 3-4. Probability (percent chance) of a Particular Number of Offshore Spills ≥1,000 bbl Occurring as a Result of Either Facility or Pipeline Operations Related to a CPA Proposed Action.

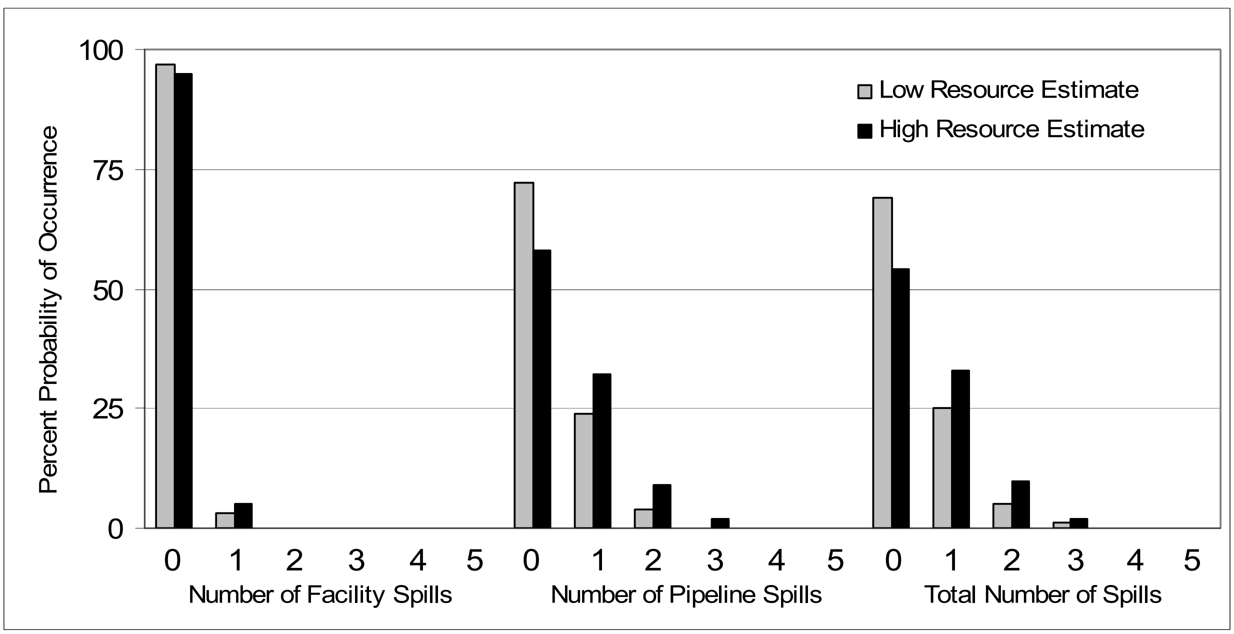

Figure 3-5. Probability (percent chance) of a Particular Number of Offshore Spills ≥1,000 bbl Occurring as a Result of Either Facility or Pipeline Operations Related to a WPA Proposed Action.

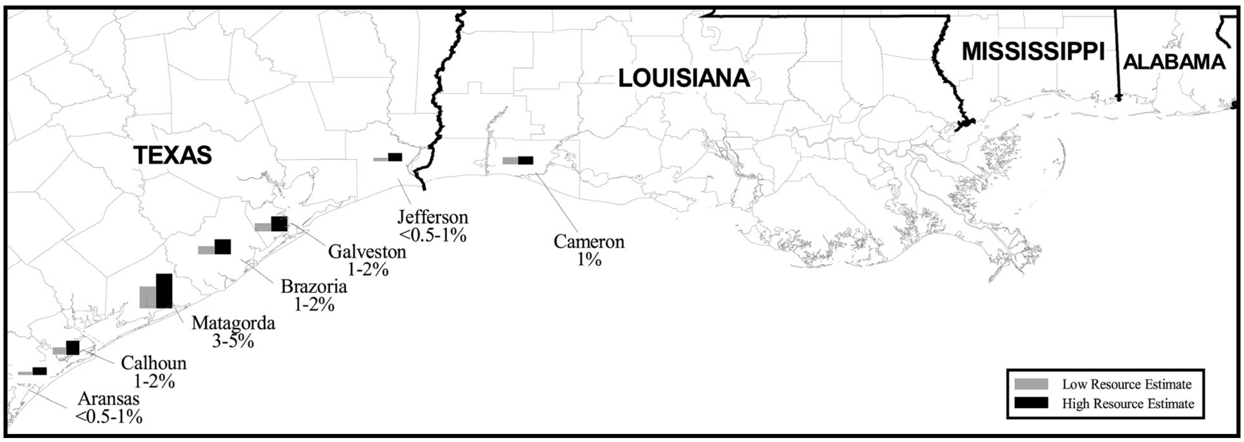

Figure 3-6. Probabilities of Oil Spills (>1,000 bbl) Occurring and Contacting within 10 Days the Shoreline (counties and parishes) as a Result of a Proposed Action in the Western Planning Area (only counties and parishes with greater than a 0.5% risk of contact within 10 days are shown).

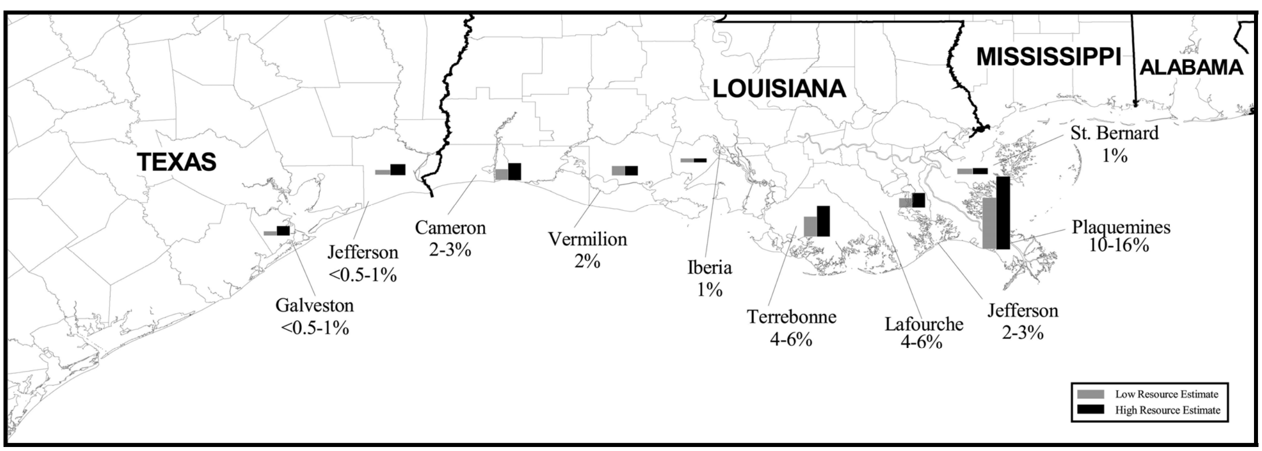

Figure 3-7. Probabilities of Oil Spills ($\geq$1,000 bbl) Occurring and Contacting within 10 Days the Shoreline (counties and parishes) as a Result of a Proposed Action in the Central Planning Area (only counties and parishes with greater than a 0.5% risk of contact within 10 days are shown).

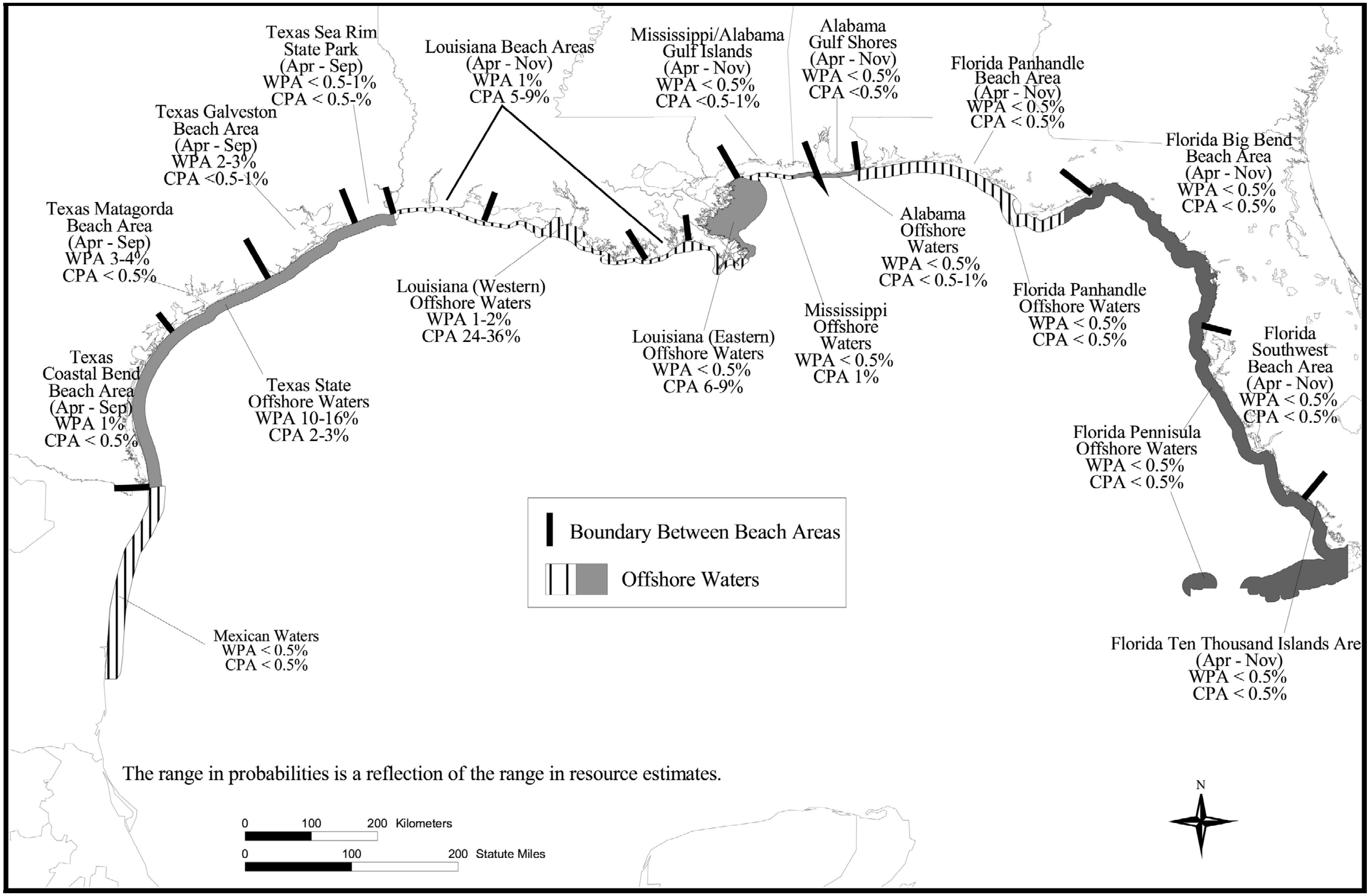

Figure 3-8. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days State Offshore Waters or Recreational Beaches as a Result of a CPA or WPA Proposed Action.

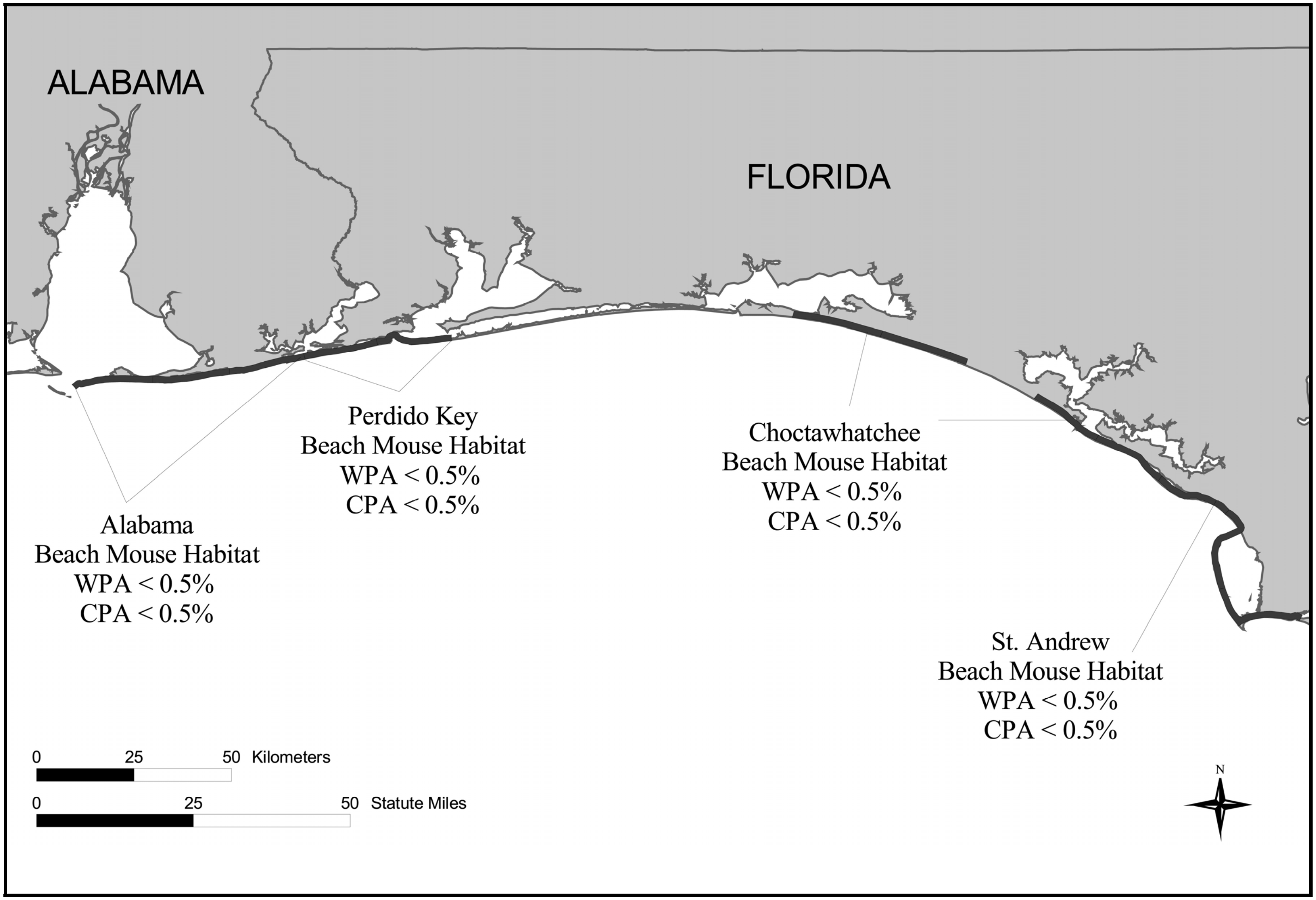

Figure 3-9. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days Endangered Beach Mice Habitats as a Result of a CPA or WPA Proposed Action.

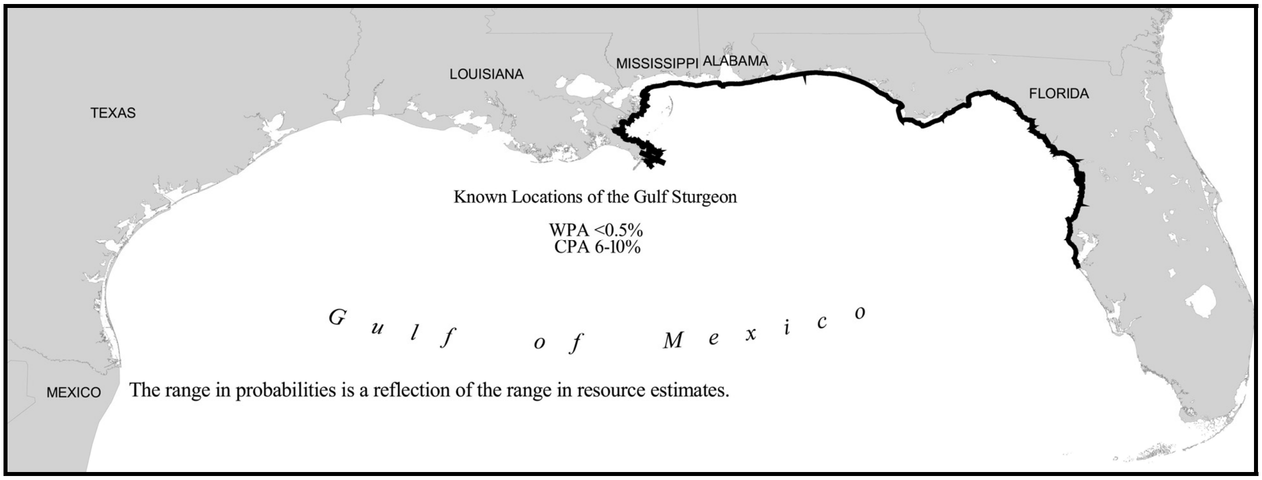

Figure 3-10. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days Known Locations of Gulf Sturgeon as a Result of CPA Proposed Action.

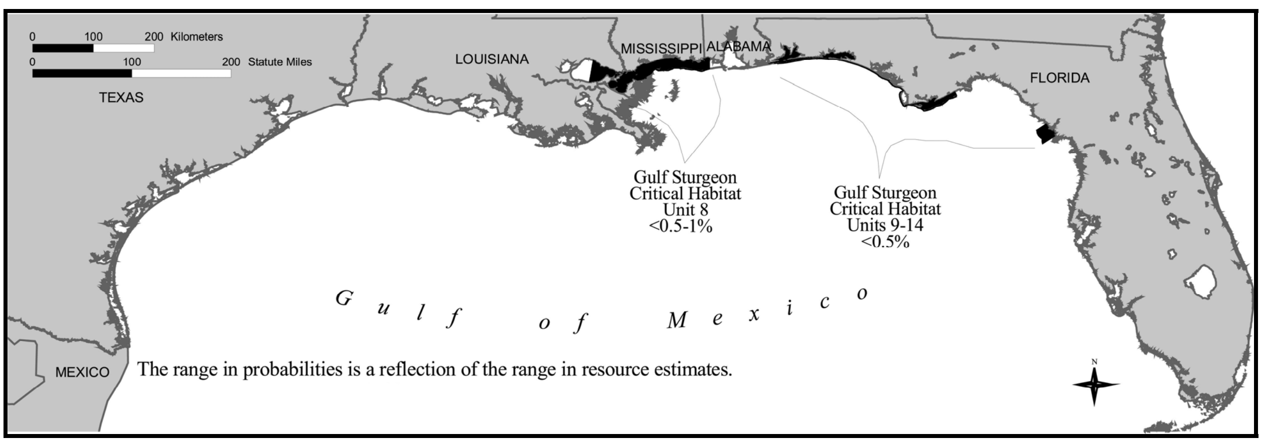

Figure 3-11. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days Gulf Sturgeon Critical Habitat as a Result of a CPA Proposed Action.

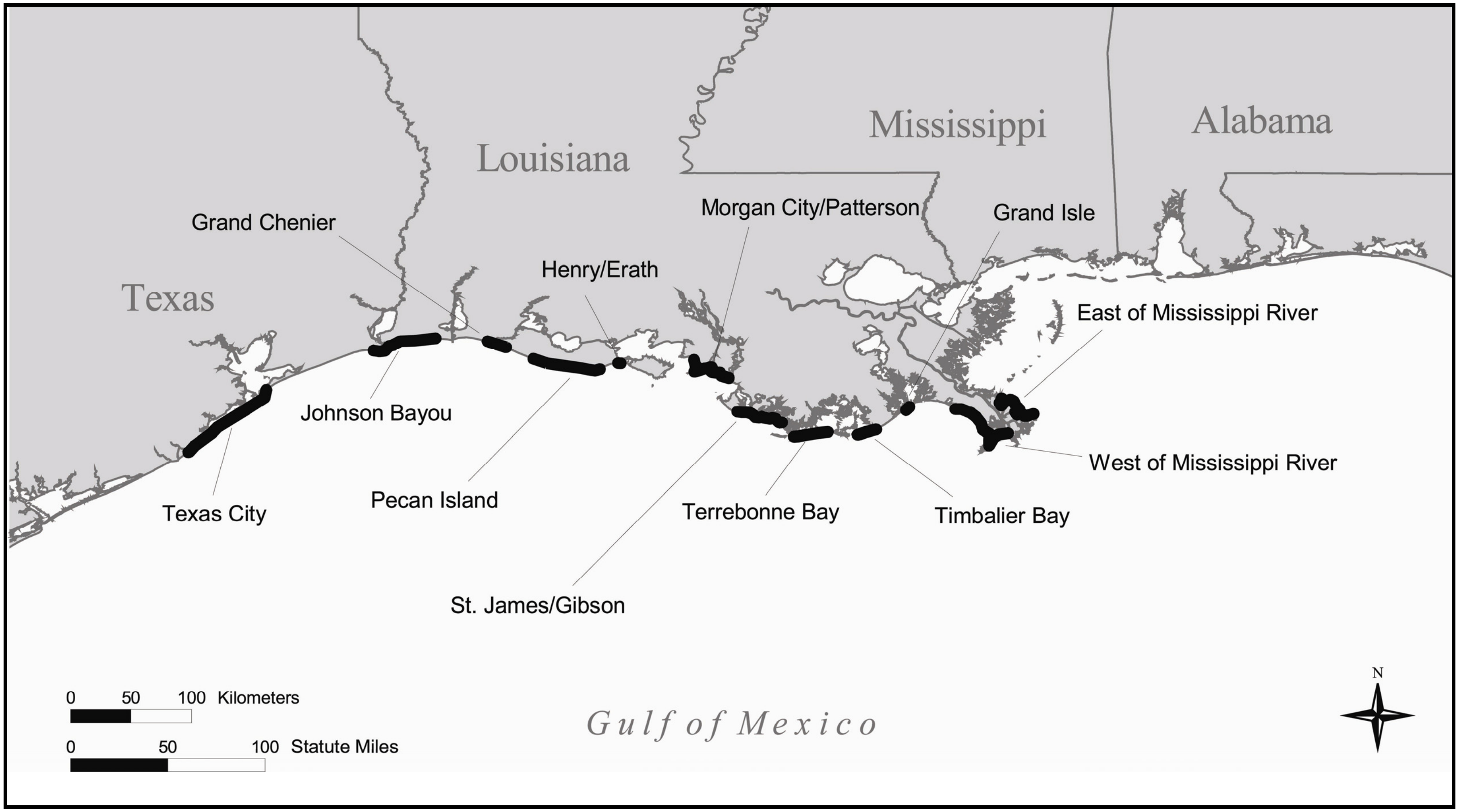

Figure 3-12. Major Oil Pipeline Landfall Areas Developed for OSRA.

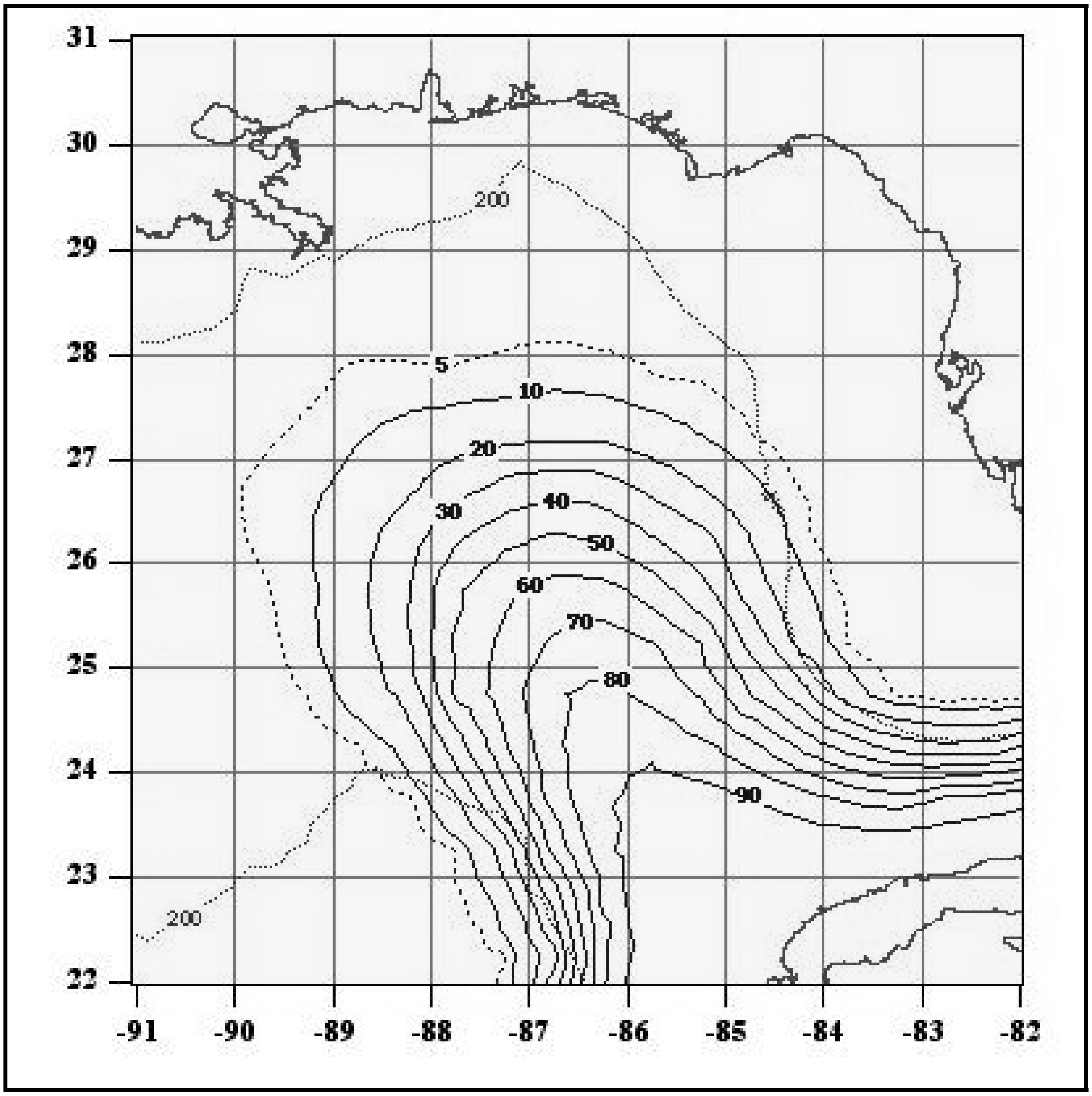

Figure 3-13. Spatial Frequency (%) of the Watermass Associated with the Loop Current in the Eastern Gulf of Mexico based on Data for the Period 1976-2003.

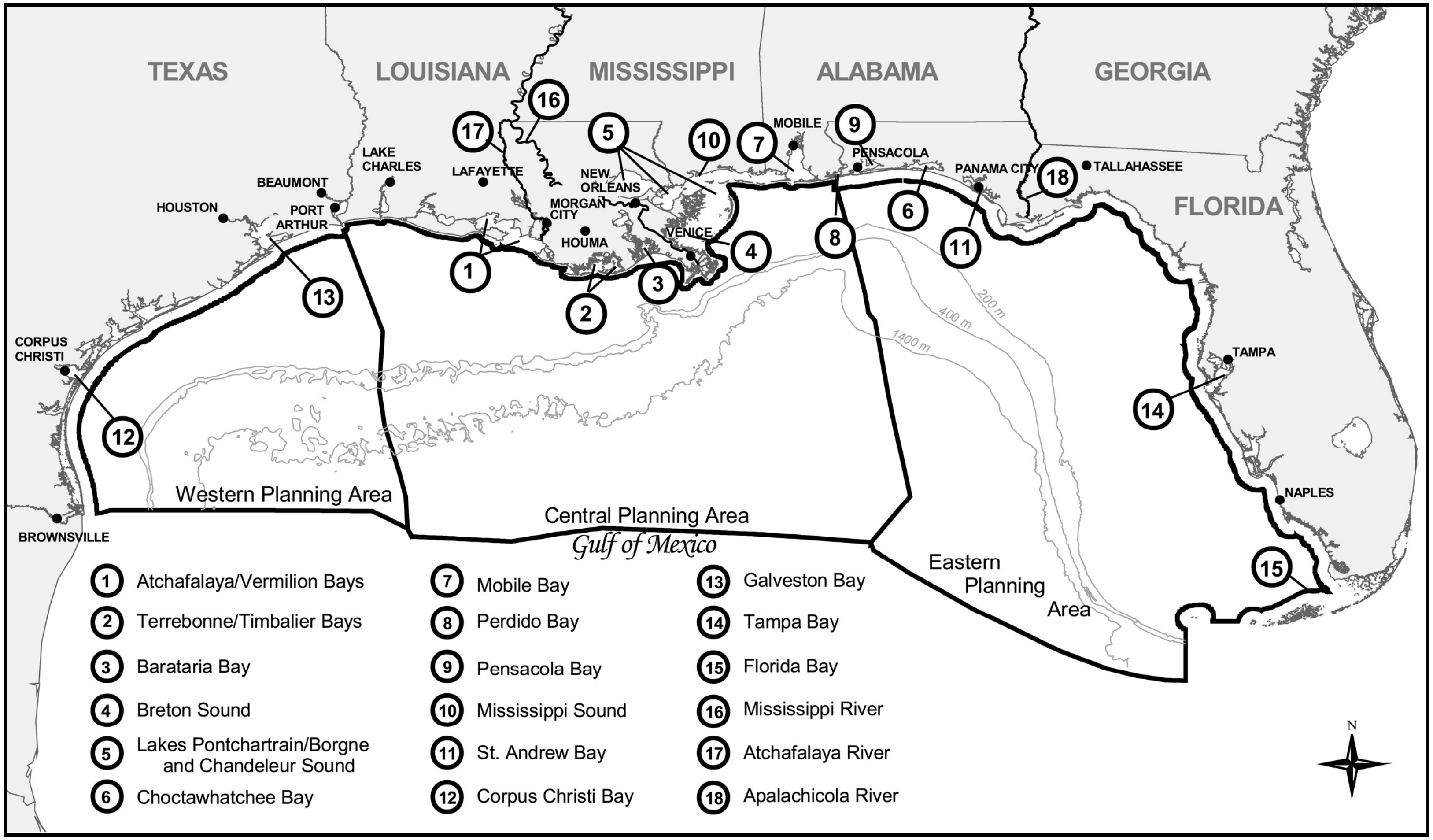

Figure 4-1. Coastal and Marine Waters of the Gulf of Mexico.

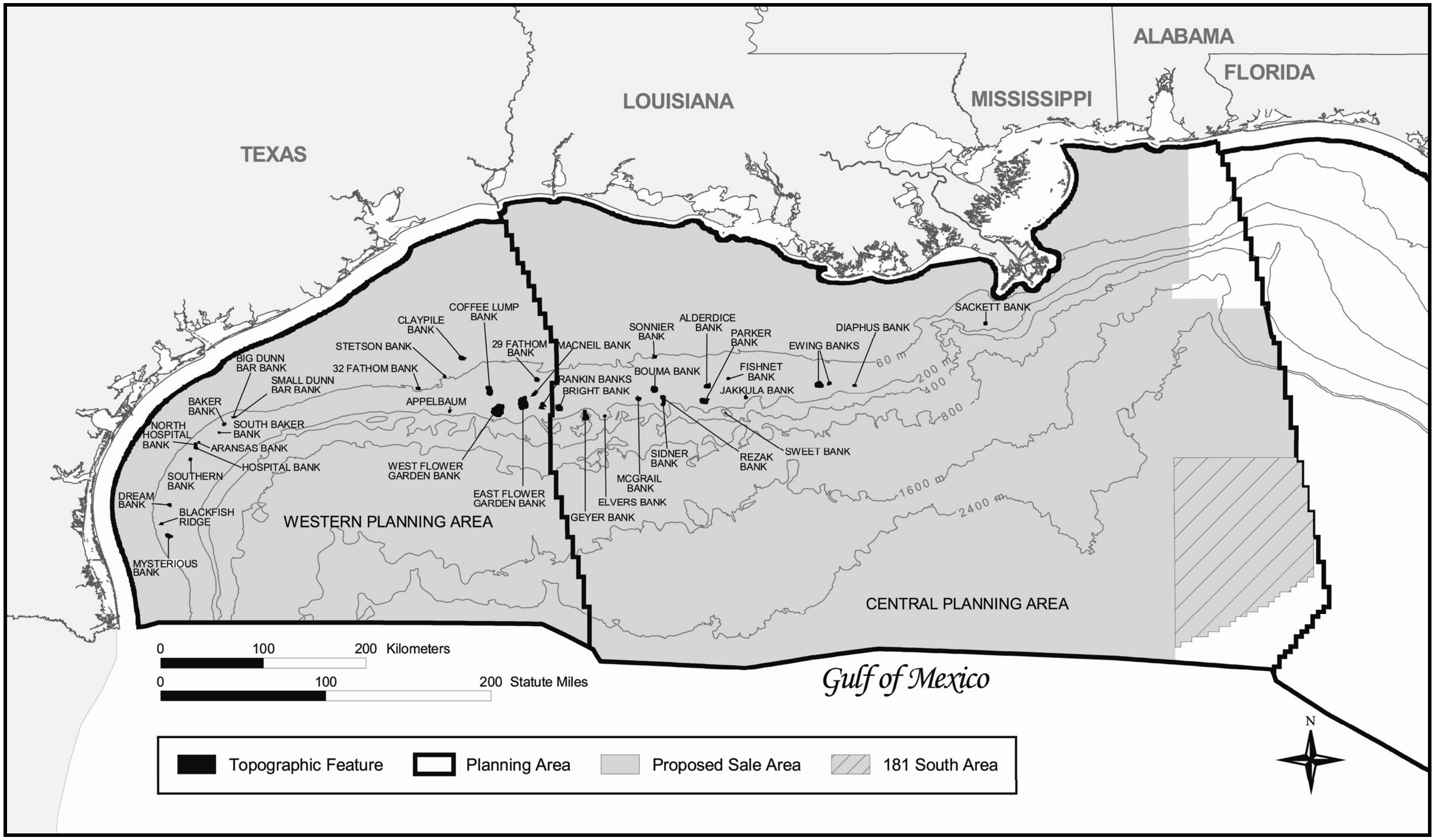

Figure 4-2. Location of Topographic Features in the Gulf of Mexico.

APPENDIX B

TABLES

Table 3-1

Projected Oil and Gas Production in the Gulf of Mexico OCS

	Proposed Action	OCS Program (2007-2046)
Central Gulf of Mexico		
Reserve/Resource Production		
Oil (BBO)	0.807-1.336[1]	21.933-24.510[1]
Gas (Tcf)	3.365-5.405[1]	90.155-102.761[1]
Western Gulf of Mexico		
Reserve/Resource Production		
Oil (BBO)	0.242-0.423	6.629-8.060
Gas (Tcf)	1.644-2,647	52.211-59.961

[1] Includes the projected activity associated with the addition of the 181 South Area.
BBO = billion barrels of oil.
Tcf = trillion cubic feet.

Table 3-2

Offshore Scenario Information Related to a Proposed Action in the Central Planning Area

	Offshore Subareas[1]								Total CPA[3]
	C0-60 (western)	C0-60 (eastern)	C60-200	C200-400	C400-800	C800-1600	C1600-2400	C>2400[2]	
Wells Drilled									
Exploration and Delineation Wells	14-16	3	9-12	7-11	9-14	10-18	7-12	8-13	67-99
Development Wells	51-59	9-10	22-26	75-107	61-83	56-91	37-59	27-43	337-477
Oil Wells	13-15	2-2	7-8	43-61	36-49	33-54	22-36	16-25	172-251
Gas Wells	38-44	7-8	15-18	32-46	25-33	23-37	15-23	11-18	165-226
Workovers and Other Well Activities	309-357	55-63	133-161	455-651	371-504	343-553	224-357	161-252	2,009-2,849
Production Structures									
Installed	17-18	3	2-3	1-3	1-3	1-4	1-3	2-3	28-40
Removed Using Explosives	10	2	2	0-1	0-1	0	0	0	14-16
Total Removed	14	2-3	2-3	1-3	1-3	1-4	1-3	2-3	24-36
Method of Oil Transportation[4]									
Percent Piped	99%	99%	100%	100%	100%	0%-50%	0%-100%	0%-100%	63%->99%
Percent Barged	1%	1%	0%	0%	0%	0%	0%	0%	<1%
Percent Tankered	0%	0%	0%	0%	0%	0%-50%	0%-100%	0%-50%	0%-37%
Length of Installed Pipelines (km)[5]	40-720	10-130	NA	NA	NA	NA	NA	NA	130-2,075
Blowouts	0	0	0	0	0-1	0-1	0	0	2-3
Service-Vessel Trips (1,000 round trips)	18-19	3	3-4	4-7	19-52	19-68	18-51	35-41	119-241
Helicopter Operations (1,000 operations)	607-1,016	107-169	71-169	36-169	36-169	36-226	36-169	75-154	1,004-2,241

[1] See Figure 3-1.
[2] Includes the projected activity associated with the addition of the 181 South Area.
[3] Subarea totals may not add up to the planning area total because of rounding.
[4] 100% of gas is assumed to be piped.
[5] Projected length of OCS pipelines does not include length in State waters.
NA means that information is not available.

Table 3-3

Offshore Scenario Information Related to a Proposed Action in the Western Planning Area

	Offshore Subareas[1]							Total WPA[2]
	W0-60	W60-200	W200-400	W400-800	W800-1600	W1600-2400	W>2400	
Wells Drilled								
Exploration and Delineation Wells	23-36	5-7	1	3-4	5-10	2-3	3-5	42-66
Development Wells	64-89	13-15	6-7	9-13	48-75	9-15	6-8	155-221
Oil Wells	3-5	2-2	1-2	6-8	29-45	6-9	3-5	51-76
Gas Wells	61-84	10-13	5-5	3-5	20-30	3-6	2-3	105-146
Workovers and Other Well Activities	392-539	77-91	35-42	56-77	294-455	56-91	35-49	945-1,344
Production Structures								
Installed	21-31	2	1	1	1-3	1-2	1	28-41
Removed Using Explosives	9-15	1	0	0	0	0	0	11-17
Total Removed	13-22	2	1	1	1-3	1	1	20-31
Method of Oil Transportation[3]								
Percent Piped	99%	100%	100%	100%	0%-50%	0%-100%	0 -100%	41%->99%
Percent Barged	1%	0%	0%	0%	0%	0%	0%	<1%
Percent Tankered	0%	0%	0%	0%	0%-50%	0%-100%	0%-100%	0%-59%
Length of Installed Pipelines (km)[4]	60-420	NA	NA	NA	NA	NA	NA	130-760
Blowouts	1	0	0	0	0-1	0	0	1-2
Service-Vessel Trips (1,000 round trips)	23-33	3	1	16-17	18-51	16-33	16-17	94-155
Helicopter Operations (1,000 operations)	300-680	30-44	14-22	14-22	14-66	14-44	14-22	400-900

[1] See Figure 3-1.
[2] Subarea totals may not add up to the planning area total because of rounding.
[3] 100% of gas is assumed to be piped.
[4] Projected length of OCS pipelines does not include length in State waters.
NA means that information is not available.

Table 3-4

Aggregate Average Lag in Months from Sales to First Spud for Leases Issued from 1983 to 1999

Water Depth	1983-1987	1985-1989	1990-1994	1995-1999
<60 m	29.3	27.8	25.8	22.9
60 m-200 m	30.5	31.0	36.0	27.2
200 m-900 m	40.4	46.4	42.9	30.0
>900 m	84.9	93.3	84.2	53.6

Source: Iledare and Kaiser, 2007.

Table 3-5

Aggregate Average Lag in Months from Sales to First Production for Leases Issued from 1983 to 1999

Water Depth	1983-1987	1985-1989	1990-1994	1995-1999
<60 m	59.0	53.2	49.5	41.1
60 m-200 m	74.7	65.7	60.3	47.5
200 m-900 m	128.1	123.0	70.2	54.1
>900 m	180.6	176.9	105.9	99.6

Source: Iledare and Kaiser, 2007.

Table 3-6

Mean Number and Sizes of Spills Estimated to Occur in
OCS Offshore Waters from an Accident Related
to Activities Supporting a Proposed Action Over a 40-Year Time Period

Spill Size Group	Spill Rate (spills/BBO)[1]	Number of Spills Estimated for a CPA Proposed Action[2]	Number of Spills Estimated for a WPA Proposed Action[2]	Estimated Spill Size[1]
0-1.0 bbl	3,357.31	2,709-4,485	812-1,420	0.07[3]
1.1-9.9 bbl	74.7	60-100	18-32	3[4]
10.0-49.9 bbl	16.18	13-22	4-7	20[4]
50.0-499.9 bbl	6.37	5-9	2-3	90[4]
500.0-999.9 bbl	0.52	<1-1	<1	640[4]
≥1,000 bbl	1.51	1-2	<1-1	4,600[4]
≥10,000 bbl	0.39	<1-1	<1	15,000[4]

Notes: The number of spills estimated is derived by application of the historical rate of spills per volume crude oil handled (1985-1999) (Anderson and LaBelle, 2000) to the projected production for a proposed action in the WPA or CPA (Table 3-1). Projected production is an estimate of recoverable resource and is influenced by supporting infrastructure, as well as economic and technological factors. The actual number of spills that may occur in the future could vary from the estimated number.

[1] Source: Anderson and LaBelle, 2000.
[2] Source: Table 3-1.
[3] Average spill size.
[4] Median spill size.

Table 3-7

Estimated Number of Spills that Could Happen in Gulf Coastal Waters
from an Accident Related to Activities Supporting a Proposed Action

Size Category	Assumed Size	CPA Proposed Action	WPA Proposed Action
Total		46-102	15-34
≤1 bbl	1 bbl	42-92	13-29
>1 bbl and <50 bbl	3 bbl	2-4	1-2
≥50 bbl and <1,000 bbl	150 bbl	2-5	1-2
≥1,000 bbl	3,000 bbl	<1-1	<1-1

Note: The estimated number of spills is obtained from the count of coastal spills for 2001 proportioned to reflect that OCS oil comprised 19 percent of the oil crossing into GOM coastal waters in 2001. Intrastate oil and refined product transport were not included. The low estimate in the range was obtained from Dickey (2006) and the high estimate was obtained from aggregated national data available on the Internet (USCG, 2001).

Sources: Dickey, personal communication, 2006; USCG, 2001; National Ocean Economics Program, 2006; USDOE, EIA, 2006b.

Table 3-8

Number and Volume of Chemical and Synthetic-Based Fluid Spills
in the Gulf of Mexico during the Years 2001-2005

Spill Size (bbl)	2001		2002		2003		2004		2005	
	Chemical	SBF	Chemical	SBF	Chemical	SBF	Chemical	SBF	Chemical	SBF
1-<50	9	4	6	11	2	11	16	5	42	7
50-<100	0	0	0	2	0	2	1	1	3	0
100-<500	2	3	2	1	1	3	2	2	2	6
500-<1,000	0	1	0	2	0	1	0	1	1	0
≥1,000	0	0	0	1	0	1	1	1	0	0
Total	11	8	8	17	3	18	20	10	48	13

Note: For the years 2001-2003, the total volume of drilling fluid was recorded. For 2004, the synthetic-based fluid fraction of the whole drilling fluid was recorded.
SBF = synthetic-based fluid.

Source: Anderson, personal communication, 2007.

Table 3-9

Record of Past Spills Where >1,000 bbl of Synthetic-Based Fluid (SBF) was Released

Date	Location	Water Depth (ft)	SBF Volume Released* (bbl)	Cause
03/01/02	WR 206	8,180	1,800	Emergency riser disconnect
05/21/03	MC 822	6,040	1,421	Riser failure
04/11/04	GC 653	4,238	1,034	Emergency riser disconnect
10/21/07	GC 726	4,686	1,061	Hole in the riser

* Volume reflects the amount of synthetic fluid, not the total drilling mud released.
GC = Green Canyon.
MC = Mississippi Canyon.
WR = Walker Ridge.

Source: USDOI, MMS, 2007i.

Table 4-1

National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Period	Primary Standards[a]	Secondary Standards[b]
Ozone	8-hour [d]	0.08 ppm (157 µg/m^3)	(same as primary)
Sulphur Dioxide	Annual	0.03 ppm (80 µg/m^3)	NA
	24-hour	0.14 ppm (365 µg/m^3)	NA
	3-hour [c]	NA	0.5 ppm (1,300 µg/m^3)
Carbon Monoxide	8-hour [c]	9.0 ppm (10 mg/m^3)	NA
	1-hour [c]	35 ppm (40 mg/m^3)	NA
Nitrogen Dioxide	Annual	0.053 ppm (100 µg/m^3)	(same as primary)
Suspended Particulate			
Matter (PM_{10})	Annual	Revoked	Revoked
	24-hour	150 µg/m^3 [e]	(same as primary)
($PM_{2.5}$)	Annual	15 µg/m^3 [f]	(same as primary)
	24-hour	35 µg/m^3 [g]	(same as primary)
Lead	Calendar Quarter	1.5 µg/m^3	(same as primary)

[a] The levels of air quality necessary, with an adequate margin of safety, to protect the public health.
[b] The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
[c] Not to be exceeded more than once a year.
[d] Three-year average of the annual fourth-highest daily maximum 8-hour average for each monitor.
[e] Based on the 99th percentile of 24-hour PM_{10} concentration at each monitor.
[f] Based on 3-year average of annual arithmetic mean concentrations.
[g] Based on 3-year average of 98th percentile of 24-hour concentrations.

Note: mg/m^3 = milligrams per cubic meter = 1,000 µg/m^{-3}.
µg/m^3 = micrograms per cubic meter.

Source: 40 CFR 50, 2005.

Table 4-2

Comparison of Hurricane-Induced Land to Water Changes by Hydrologic Basin in Coastal Louisiana during the 2005 Hurricane Season

Hurricane	Basin	New Water Area (mi^2)
	Mississippi River Delta	-18
	Breton Sound	-41
	Pontchartrain	-19
	Pearl River	-4
Katrina	Total	-82
	Calcasieu/Sabine	-22
	Mermentau	-62
	Teche/Vermilion	-5
	Atchafalaya	-9
	Terrebonne	-19
Rita	Total	-117
Both Hurricanes	Barataria	-18
Total		-217

Table 4-3

Comparison of Habitats Affected by Storm-Induced Land/Water Change

Habitat Type	Comparison of Pre- and Post-Katrina Satellite Imagery Land Water Habitat Changes (mi^2)		Net Change (mi^2)
	Pre-Katrina (2004)	Post-Katrina (2005)	
Forested wetlands	1,329	1,328	-1
Other land*	397	371	-26
Fresh marsh	1,542	1,420	-122
Intermediate marsh	1,087	997	-90
Brackish marsh	878	845	-33
Saline marsh	690	662	-28
Water**	6,995	7,295	300
Total land/water change (300-83 mi^2=217 mi^2)***			217

* This category includes developed land, agricultural lands, and natural ridges without wetland vegetation.

** This category includes 40 ac of flooded agricultural land and 43 ac of burned flooded marsh (83 mi^2).

***This number represents the total square miles of habitat loss and water change based on adjustments noted for burned marsh and agricultural land (i.e., 300 mi^2-83 mi^2=217 mi^2 of land to water).

Table 4-4

Estimated Abundance of Cetaceans
in the Northern Gulf of Mexico Oceanic Waters

Species	Common Name	Estimated Number of Individuals
Balaenoptera edeni	Bryde's whale	15
Physeter macrocephalus	Sperm whale*	1,665
Kogia spp.	Dwarf or pygmy sperm whale	453
Ziphius cavirostris	Cuvier's beaked whale	65
Mesoplodon sp.	Blainesville/Gervais beaked whale	57
Unidentified ziphiid	Unidentified beaked whales	337
Feresa attenuata	Pygmy killer whale	323
Pseudorca crassidens	False killer whale	777
Orcinus orca	Killer whale	49
Globicephala sp.	Pilot whale	716
Peponocephala electra	Melonheaded whale	2,283
Grampus griseus	Risso's dolphin	1,589
Tursiops truncatus	Bottlenose dolphin	25,239[1]
Steno bredanensis	Rough-toothed dolphin	2,942
Lagenodelphis hosei	Fraser's dolphin	unknown
Stenella frontalis	Atlantic spotted dolphin	27,393
Stenella longirostris	Spinner dolphin	1,989
Stenella attenuate	Pantropical spotted dolphin	34,067
Stenella clymene	Clymene dolphin	6,575
Stenella coeruleoalba	Striped dolphin	3,325

*Endangered.
[1]Continental shelf and oceanic estimates combined.

Source: Waring et al., 2007.

Table 4-5

Sea Turtle Taxa of the Northern Gulf of Mexico

Order Testudines (turtles)	Relative Occurrence*	ESA Status**
Family Cheloniidae (hardshell sea turtles)		
Loggerhead sea turtle (*Caretta caretta*)	Common	Threatened/Endangered
Green sea turtle (*Chelonia mydas*)	Common	Endangered
Hawksbill sea turtle (*Eretmochelys imbricata*)	Rare	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempi*)	Common	Endangered
Family Dermochelyidae (leatherback sea turtle)		
Leatherback sea turtle (*Dermochelys coriacia*)	Uncommon	Endangered

*Population status in the northern GOM is summarized according to the following categories:

Common: A common species is one that is abundant wherever it occurs in the region (i.e., the northern GOM). Most common species are widely distributed over the area.

Uncommon: An uncommon species may or may not be widely distributed but does not occur in large numbers. Uncommon species are not necessarily rare or endangered.

Rare: A rare species is one that is present in such small numbers throughout the region that it is seldom seen. Although not threatened with extinction, a rare species may become endangered if conditions in its environment change.

**Endangered Species Act (ESA) status is summarized according to listing status under the following categories:

Endangered: Species determined to be in imminent danger of extinction throughout all of a significant portion of their range.

Threatened: Species determined likely to become endangered in the foreseeable future.

Table 4-6

2006 Top Species Commonly Caught by Recreational Fishers
in the Marine Recreational Fisheries Statistics for the Gulf Coast States (except Texas)

Species	Total All Fish (#)	Total All Fish (lb)	Inland (#)	Inland (lb)	Ocean (#)	Ocean (lb)
Black drum	1,267,386	2,480,078	1,219,109	2,351,043	48,277	129,035
Dolphins	81,400	188,130	870		80,530	188,130
Gray snapper	2,594,974	1,381,957	2,043,579	483,753	551,395	898,204
Greater amberjack	66,394	683,364	1,850		64,544	683,364
Herrings	41,716,268	152,455	41,255,403	152,455	460,865	0
King mackerel	498,355	1,349,952	362,809	590,059	135,546	759,893
Mycteroperca groupers	644,735	231,395	603,463	110,062	41,272	121,333
Pinfishes	6,736,540	369,738	5,710,573	346,356	1,025,967	23,382
Red drum	8,596,876	13,576,884	8,116,594	12,063,913	480,282	1,512,971
Red snapper	1,586,841	1,485,529	62,979	33,287	1,523,862	1,452,242
Saltwater catfishes	8,773,173	862,261	7,673,254	742,800	1,099,919	119,461
Sand seatrout	3,457,656	1,237,721	3,337,144	1,180,793	120,512	56,928
Sheepshead	2,403,692	3,236,779	2,133,947	2,429,966	269,745	806,813
Spotted seatrout	30,439,521	15,500,347	29,925,279	15,196,037	514,242	304,310

Source: USDOC, NMFS, 2007f.

Table 4-7

2006 Recreational Fishing Participation
in the Marine Recreational Fisheries Statistics for the Gulf Coast States

State	Participation Estimate (number of people)			
	Coastal	Non-Coastal	Out-of-State	Total
West Florida	2,083,835		1,988,445	4,072,281
Alabama	232,799	183,511	319,720	736,030
Mississippi	143,417	23,382	26,532	193,331
Louisiana	867,742	108,491	197,841	1,174,074
Gulf Total	3,327,793	315,384	2,532,538	6,175,716

Source: USDOC, NMFS, 2007f.

Table 4-8

2006 Mode of Fishing in the Marine Recreational Fisheries Statistics
for the Gulf Coast States (except Texas)

State	Area	Number of Trips	% of State Total
Alabama	Shore Ocean (<3 mi)	836,479	39
	Shore Inland	372,368	17
	Charter Ocean (<3 mi)	6,238	0
	Charter Ocean (>3 mi)	61,894	3
	Charter Inland	9,294	0
	Private/Rental Ocean (<3 mi)	253,917	12
	Private/Rental Ocean (>3 mi)	184,991	9
	Private/Rental Inland	418,244	20
	Total	2,143,425	
West Florida	Shore Ocean (<3 mi)	3,542,065	22
	Shore Inland	3,195,967	19
	Charter Ocean (<3 mi)	172,528	1
	Charter Ocean (>3 mi)	268,956	2
	Charter Inland	118,440	1
	Private/Rental Ocean (<3 mi)	3,654,698	23
	Private/Rental Ocean (>3 mi)	1,015,560	6
	Private/Rental Inland	4,262,060	26
	Total	16,230,274	
Louisiana	Shore Ocean (<3 mi)	96,247	2
	Shore Inland	837,514	19
	Charter Ocean (<3 mi)	11,845	0
	Charter Ocean (>3 mi)	56,052	1
	Charter Inland	108,181	2
	Private/Rental Ocean (<3 mi)	166,798	4
	Private/Rental Ocean (>3 mi)	120,391	3
	Private/Rental Inland	3,094,252	69
	Total	4,491,280	
Mississippi	Shore Ocean (<3 mi)	727	0
	Shore Inland	324,295	32
	Charter Ocean (<3 mi)	3,928	0
	Charter Ocean (>3 mi)	68	0
	Charter Inland	3,058	0
	Private/Rental Ocean (<3 mi)	25,895	3
	Private/Rental Ocean (>3 mi)	29,518	3
	Private/Rental Inland	610,422	61
	Total	997,911	
Gulf Total	Shore Ocean (<3 mi)	4,475,518	19
	Shore Inland	4,730,144	20
	Charter Ocean (<3 mi)	194,539	1
	Charter Ocean (>3 mi)	386,970	2
	Charter Inland	238,973	1
	Private/Rental Ocean (<3 mi)	4,101,308	17
	Private/Rental Ocean (>3 mi)	1,350,460	6
	Private/Rental Inland	8,384,978	35
Total		23,862,890	

Source: USDOC, NMFS, 2007f.

Table 4-9

Employment and Establishments in Tourism-Related Industries in 2005 by Coastal County and Parish

Area	Employment	Establishments	Area	Employment	Establishments
Texas			Alabama		
Cameron	20,192	1,046	Baldwin	13,084	690
Willacy	543	56	Mobile	26,101	1,322
Aransas	843	118	Alabama Total	39,185	2,012
Kenedy	10	1			
Kleberg	1,932	114	Florida		
Nueces	24,000	1,281	Bay	14,651	846
Refugio	414	22	Franklin	963	82
San Patricio	3,876	224	Gulf	561	51
Brazoria	12,962	686	Escambia	20,783	965
Matagorda	1,750	159	Okaloosa	17,768	824
Calhoun	1,148	94	Santa Rosa	6,569	321
Jackson	682	48	Walton	4,061	206
Jefferson	15,689	830	Jefferson	527	49
Chambers	1,205	896	Wakulla	849	68
Galveston	20,085	1,010	Taylor	1,118	80
Harris	253,614	11,700	Citrus	5,937	359
Texas Total	358,945	18,285	Dixie	378	46
			Levy	2,297	151
Louisiana			Hernando	8,283	388
Cameron	326	29	Hillsborough	92,467	3,678
Iberia	5,330	213	Pasco	19,798	1,016
Vermilion	1,996	158	Pinellas	68,259	3,568
Lafourche	5,391	299	Collier	30,501	1,191
St. Mary	4,622	201	Lee	43,592	1,860
Terrebonne	8,177	412	Miami-Dade	166,316	8,388
Orleans	56,900	1,972	Monroe	15,065	899
Plaquemines	1,317	110	Charlotte	9,126	414
St. Bernard	3,409	210	Manatee	17,546	907
St. Tammany	15,115	755	Sarasota	28,374	1,371
Louisiana Total	102,583	4,359	Florida Total	575,789	27,728
Mississippi			Gulf States Total	1,113,214	53,920
Hancock	3,623	160			
Harrison	26,209	764			
Jackson	6,880	612			
Mississippi Total	36,712	1,536			

Source: USDOC, Bureau of the Census, 2007.

Table 4-10

Number of Shipwrecks by Planning Area and Lease Area

Western Planning Area		Central Planning Area	
Lease Area	Number of Wrecks	Lease Area	Number of Wrecks
Alaminos Canyon	1	Atwater Valley	4
Brazos	62	Bay Marchand	3
Corpus Christi	3	Breton Sound	13
East Breaks	7	Chandeleur	8
Galveston	117	Desoto Canyon	3
Garden Banks	2	East Cameron	48
High Island	110	Eugene Island	94
Keathley Canyon	1	Ewing Bank	3
Matagorda Island	45	Green Canyon	14
Mustang Island	72	Grand Isle	31
North Padre Island	39	Henderson*	4
Port Isabel	2	Lloyd Ridge*	4
South Padre Island	53	Lund	11
Sabine Pass (Texas)	2	Mississippi Canyon	44
		Mobile	55
Total	516	Main Pass	64
		South Pelto	16
		Sabine Pass (Louisiana)	16
		South Marsh Island	31
		South Pass	35
		Ship Shoal	93
		South Timbalier	90
		Viosca Knoll	23
		Vermilion	62
		West Cameron	119
		West Delta	63
		Walker Ridge	3
		Total	954

* Located within the 181 South Area.

Table 4-11

Baseline Population Projections (in thousands) by Economic Impact Area

Calendar Year	AL-1	MS-1	LA-1	LA-2	LA-3	LA-4	TX-1	TX-2	TX-3	FL-1	FL-2	FL-3	FL-4
2005	695.00	476.96	333.81	560.68	1,042.49	1,379.10	1,651.49	586.93	5,606.22	855.15	607.41	3,419.80	5,948.71
2006	705.72	450.51	331.06	573.86	1,088.03	1,091.15	1,686.24	597.58	5,780.54	860.36	616.80	3,493.31	6,023.16
2007	713.67	457.22	333.40	577.41	1,098.80	1,111.86	1,724.29	604.87	5,867.44	882.93	627.03	3,548.82	6,164.61
2008	719.85	462.80	334.91	579.55	1,106.87	1,129.79	1,758.03	610.66	5,939.77	903.28	635.70	3,595.51	6,290.56
2009	725.96	468.32	336.40	581.64	1,114.83	1,147.56	1,791.49	616.39	6,011.40	923.48	644.29	3,641.76	6,415.45
2010	732.10	473.85	337.91	583.77	1,122.84	1,165.31	1,824.91	622.13	6,083.09	943.63	652.89	3,688.03	6,540.11
2011	738.38	479.47	339.50	586.03	1,131.09	1,183.28	1,858.62	628.00	6,155.95	963.92	661.61	3,735.00	6,665.77
2012	744.83	485.19	341.17	588.44	1,139.60	1,201.45	1,892.65	634.01	6,230.07	984.37	670.47	3,782.72	6,792.53
2013	751.46	491.03	342.93	591.00	1,148.39	1,219.90	1,927.09	640.17	6,305.66	1,005.02	679.48	3,831.32	6,920.68
2014	757.94	496.75	344.62	593.44	1,156.95	1,238.05	1,961.05	646.20	6,379.83	1,025.40	688.34	3,879.05	7,047.07
2015	764.70	502.66	346.45	596.12	1,165.96	1,256.65	1,995.70	652.47	6,456.39	1,046.14	697.45	3,928.22	7,175.91
2016	771.53	508.60	348.31	598.88	1,175.07	1,275.28	2,030.36	658.79	6,533.27	1,066.86	706.60	3,977.56	7,304.66
2017	778.41	514.61	350.19	601.64	1,184.26	1,294.17	2,065.62	665.17	6,611.06	1,087.99	715.87	4,027.53	7,435.71
2018	785.36	520.69	352.08	604.42	1,193.51	1,313.35	2,101.49	671.62	6,689.79	1,109.54	725.26	4,078.12	7,569.12
2019	792.37	526.84	353.98	607.21	1,202.84	1,332.82	2,137.99	678.12	6,769.45	1,131.52	734.78	4,129.35	7,704.92
2020	798.83	532.35	355.78	609.88	1,211.52	1,349.77	2,168.99	684.07	6,840.79	1,149.74	743.20	4,174.95	7,819.64
2021	806.03	538.52	357.83	612.95	1,221.22	1,368.94	2,204.48	690.71	6,920.68	1,170.88	752.68	4,226.10	7,951.26
2022	813.29	544.77	359.90	616.03	1,231.00	1,388.38	2,240.56	697.41	7,001.50	1,192.40	762.27	4,277.88	8,085.09
2023	820.62	551.09	361.97	619.12	1,240.86	1,408.09	2,277.22	704.18	7,083.27	1,214.32	771.99	4,330.30	8,221.17
2024	828.02	557.48	364.06	622.24	1,250.79	1,428.09	2,314.49	711.01	7,165.99	1,236.65	781.83	4,383.35	8,359.55
2025	834.83	563.22	366.04	625.21	1,260.03	1,445.61	2,346.46	717.26	7,240.24	1,255.42	790.58	4,430.72	8,477.73
2026	842.62	569.79	368.36	628.73	1,270.63	1,465.76	2,383.54	724.41	7,325.18	1,277.40	800.61	4,484.96	8,615.01
2027	850.49	576.43	370.69	632.27	1,281.32	1,486.20	2,421.22	731.63	7,411.13	1,299.76	810.77	4,539.86	8,754.51
2028	858.43	583.16	373.04	635.83	1,292.11	1,506.92	2,459.49	738.92	7,498.08	1,322.52	821.06	4,595.44	8,896.28
2029	866.44	589.96	375.40	639.41	1,302.98	1,527.93	2,498.36	746.28	7,586.06	1,345.67	831.48	4,651.69	9,040.34
2030	873.80	596.07	377.63	642.82	1,313.05	1,546.38	2,531.89	752.99	7,664.98	1,365.32	840.74	4,701.92	9,164.13
2031	881.95	603.02	380.02	646.43	1,324.10	1,567.94	2,571.91	760.50	7,754.91	1,389.22	851.41	4,759.47	9,312.53
2032	890.19	610.05	382.43	650.08	1,335.24	1,589.80	2,612.56	768.07	7,845.90	1,413.54	862.21	4,817.74	9,463.33
2033	898.50	617.17	384.85	653.74	1,346.48	1,611.96	2,653.86	775.73	7,937.95	1,438.29	873.15	4,876.72	9,616.57
2034	906.89	624.36	387.28	657.42	1,357.81	1,634.43	2,695.80	783.45	8,031.08	1,463.47	884.23	4,936.42	9,772.29
2035	915.35	631.65	389.74	661.12	1,369.23	1,657.22	2,738.41	791.26	8,125.31	1,489.09	895.45	4,996.85	9,930.54
2036	923.90	639.01	392.21	664.84	1,380.76	1,680.33	2,781.69	799.14	8,220.65	1,515.16	906.81	5,058.02	10,091.35
2037	932.52	646.47	394.69	668.59	1,392.38	1,703.75	2,825.66	807.11	8,317.10	1,541.68	918.32	5,119.93	10,254.76
2038	941.23	654.01	397.19	672.35	1,404.10	1,727.51	2,870.32	815.15	8,414.68	1,568.67	929.97	5,182.61	10,420.81
2039	950.02	661.63	399.70	676.14	1,415.91	1,751.59	2,915.69	823.27	8,513.41	1,596.14	941.77	5,246.06	10,589.56
2040	958.88	669.35	402.24	679.95	1,427.83	1,776.01	2,961.77	831.47	8,613.29	1,624.08	953.72	5,310.28	10,761.04
2041	967.84	677.16	404.78	683.77	1,439.84	1,800.77	3,008.59	839.75	8,714.35	1,652.51	965.82	5,375.28	10,935.29
2042	976.87	685.06	407.35	687.63	1,451.96	1,825.88	3,056.14	848.12	8,816.60	1,681.44	978.08	5,441.09	11,112.37
2043	985.99	693.05	409.93	691.50	1,464.18	1,851.33	3,104.44	856.57	8,920.04	1,710.88	990.49	5,507.69	11,292.32
2044	995.20	701.13	412.52	695.39	1,476.50	1,877.14	3,153.51	865.11	9,024.70	1,740.83	1,003.06	5,575.12	11,475.18
2045	1,004.49	709.31	415.13	699.31	1,488.93	1,903.31	3,203.36	873.72	9,130.58	1,771.31	1,015.78	5,643.37	11,660.99
2046	1,013.87	717.58	417.76	703.25	1,501.46	1,929.85	3,253.99	882.43	9,237.71	1,802.32	1,028.67	5,712.45	11,849.82
2047	1,023.33	725.95	420.41	707.21	1,514.09	1,956.75	3,305.42	891.22	9,346.09	1,833.88	1,041.73	5,782.38	12,041.71
2048	1,032.89	734.41	423.07	711.19	1,526.84	1,984.03	3,357.66	900.10	9,455.75	1,865.98	1,054.94	5,853.17	12,236.70

Notes: Actual Woods & Poole projections for 2005 through 2010, 2015, 2020, 2025, and 2030.
Missing estimates through 2030 calculated using average annual growth rate for the 5-year period; projections after 2030 calculated using the average annual growth rate from 2025 to 2030.

Source: Woods & Poole Economics, Inc., 2007.

Table 4-12

Baseline Employment Projections (in thousands) by Economic Impact Area

Calendar Year	AL-1	MS-1	LA-1	LA-2	LA-3	LA-4	TX-1	TX-2	TX-3	FL-1	FL-2	FL-3	FL-4
2005	364.12	240.86	175.21	301.34	612.65	763.61	732.70	292.73	3,235.85	487.32	320.79	1,959.96	3,389.60
2006	369.61	226.97	176.80	308.37	635.01	594.14	747.93	297.69	3,298.53	499.95	327.04	2,001.44	3,460.73
2007	375.11	231.56	179.34	312.41	643.81	612.02	763.14	302.61	3,366.19	512.60	333.30	2,042.96	3,531.89
2008	380.61	236.15	181.89	316.47	652.58	629.89	778.37	307.56	3,433.87	525.26	339.60	2,084.48	3,603.08
2009	386.10	240.75	184.45	320.52	661.36	647.77	793.60	312.48	3,501.57	537.91	345.89	2,126.02	3,674.27
2010	391.60	245.35	187.02	324.57	670.14	665.64	808.82	317.40	3,569.28	550.57	352.18	2,167.58	3,745.49
2011	397.10	249.95	189.60	328.62	678.91	683.52	824.05	322.30	3,637.02	563.23	358.48	2,209.13	3,816.71
2012	402.59	254.56	192.18	332.67	687.68	701.38	839.27	327.21	3,704.77	575.88	364.78	2,250.69	3,887.95
2013	408.09	259.17	194.78	336.72	696.45	719.26	854.48	332.10	3,772.56	588.55	371.08	2,292.26	3,959.19
2014	413.59	263.78	197.38	340.77	705.22	737.14	869.71	336.99	3,840.35	601.21	377.37	2,333.82	4,030.46
2015	419.08	268.39	200.00	344.81	713.98	755.00	884.93	341.86	3,908.16	613.87	383.68	2,375.38	4,101.72
2016	424.58	273.01	202.65	348.87	722.74	772.87	900.15	346.72	3,976.04	626.53	389.98	2,416.96	4,173.01
2017	430.15	277.71	205.33	352.97	731.61	791.17	915.63	351.64	4,045.09	639.46	396.38	2,459.27	4,245.55
2018	435.79	282.49	208.05	357.12	740.58	809.90	931.38	356.64	4,115.35	652.65	402.89	2,502.32	4,319.34
2019	441.50	287.36	210.81	361.31	749.67	829.07	947.40	361.71	4,186.82	666.11	409.51	2,546.12	4,394.42
2020	446.56	291.50	213.24	365.08	757.78	844.36	961.03	366.14	4,247.54	677.19	415.19	2,583.28	4,458.19
2021	452.06	296.13	215.94	369.13	766.54	862.23	976.26	370.96	4,315.54	689.85	421.48	2,624.87	4,529.54
2022	457.62	300.84	218.68	373.23	775.39	880.48	991.72	375.83	4,384.62	702.75	427.88	2,667.12	4,602.02
2023	463.26	305.62	221.45	377.37	784.35	899.11	1,007.44	380.77	4,454.81	715.89	434.37	2,710.06	4,675.67
2024	468.96	310.48	224.26	381.56	793.41	918.14	1,023.40	385.78	4,526.13	729.28	440.96	2,753.69	4,750.49
2025	474.05	314.66	226.75	385.34	801.55	933.71	1,037.16	390.21	4,587.53	740.51	446.68	2,791.22	4,814.91
2026	479.54	319.31	229.50	389.39	810.30	951.57	1,052.38	394.98	4,655.65	753.17	452.97	2,832.80	4,886.29
2027	485.10	324.03	232.29	393.49	819.14	969.78	1,067.83	399.80	4,724.79	766.05	459.35	2,875.01	4,958.73
2028	490.73	328.82	235.11	397.63	828.07	988.33	1,083.50	404.69	4,794.96	779.14	465.82	2,917.84	5,032.25
2029	496.42	333.68	237.97	401.82	837.10	1,007.24	1,099.40	409.63	4,866.17	792.47	472.38	2,961.31	5,106.86
2030	501.53	337.91	240.52	405.61	845.27	1,023.03	1,113.27	414.05	4,928.16	803.82	478.14	2,999.14	5,171.83
2031	507.35	342.90	243.44	409.88	854.49	1,042.60	1,129.61	419.11	5,001.35	817.56	484.87	3,043.82	5,248.50
2032	513.23	347.97	246.40	414.19	863.81	1,062.55	1,146.19	424.23	5,075.62	831.54	491.70	3,089.17	5,326.32
2033	519.18	353.11	249.39	418.55	873.24	1,082.88	1,163.01	429.42	5,151.00	845.76	498.63	3,135.20	5,405.28
2034	525.20	358.32	252.42	422.95	882.76	1,103.60	1,180.08	434.67	5,227.49	860.22	505.65	3,181.91	5,485.42
2035	531.29	363.62	255.49	427.40	892.39	1,124.71	1,197.40	439.98	5,305.12	874.93	512.77	3,229.31	5,566.75
2036	537.46	368.99	258.59	431.90	902.12	1,146.23	1,214.97	445.36	5,383.91	889.89	520.00	3,277.42	5,649.28
2037	543.69	374.44	261.73	436.45	911.97	1,168.16	1,232.80	450.80	5,463.86	905.11	527.32	3,326.25	5,733.03
2038	549.99	379.97	264.91	441.04	921.91	1,190.51	1,250.90	456.31	5,545.00	920.58	534.75	3,375.81	5,818.03
2039	556.37	385.59	268.13	445.68	931.97	1,213.29	1,269.26	461.88	5,627.35	936.32	542.28	3,426.10	5,904.28
2040	562.82	391.29	271.38	450.37	942.14	1,236.50	1,287.89	467.53	5,710.92	952.33	549.92	3,477.14	5,991.82
2041	569.35	397.07	274.68	455.11	952.41	1,260.16	1,306.79	473.24	5,795.73	968.62	557.66	3,528.95	6,080.65
2042	575.95	402.93	278.01	459.89	962.80	1,284.27	1,325.97	479.03	5,881.80	985.18	565.52	3,581.52	6,170.80
2043	582.63	408.89	281.39	464.73	973.31	1,308.84	1,345.43	484.88	5,969.15	1,002.03	573.48	3,634.88	6,262.29
2044	589.39	414.93	284.81	469.62	983.92	1,333.88	1,365.18	490.81	6,057.79	1,019.16	581.56	3,689.04	6,355.13
2045	596.22	421.06	288.27	474.56	994.66	1,359.40	1,385.21	496.80	6,147.75	1,036.59	589.75	3,744.00	6,449.35
2046	603.14	427.28	291.77	479.56	1,005.51	1,385.41	1,405.54	502.88	6,239.05	1,054.31	598.06	3,799.78	6,544.96
2047	610.13	433.59	295.31	484.60	1,016.47	1,411.92	1,426.17	509.02	6,331.71	1,072.34	606.48	3,856.39	6,642.00
2048	617.20	440.00	298.90	489.70	1,027.56	1,438.93	1,447.10	515.24	6,425.74	1,090.67	615.03	3,913.84	6,740.47

Notes: Actual Woods & Poole projections for 2005 through 2010, 2015, 2020, 2025, and 2030.
Missing estimates through 2030 calculated using average annual growth rate for the 5-year period; projections after 2030 calculated using the average annual growth rate from 2025 to 2030.

Source: Woods & Poole Economics, Inc., 2007.

APPENDIX C

MMS-Funded Hurricane Research and Studies

MMS-FUNDED HURRICANE RESEARCH AND STUDIES

Subject	Description
Hurricanes Katrina and Rita	
Assessment of Fixed Offshore Platform Performance in Hurricanes Katrina and Rita (Project No. 578) (completed May 31, 2007)	The objective of this effort was to conduct a qualitative and quantitative assessment of fixed offshore platforms that were affected by Hurricane Katrina and/or Rita. Resulting data was evaluated to determine if any common trends occurred, and also to determine if current American Petroleum Institute (API) standards are an accurate indicator of expected performance. Coordination and consultation with the API HEAT group occurred throughout the project.
Joint Industry Project (JIP) to Study Risk-Based Restarts of Untreated Subsea Oil and Gas Flowlines in the GOMR (Project No. 579)	This project assesses potential solutions to the disruptions of production restart from hydrates affecting pipelines after a long shut-in period such as a hurricane. Preliminary work shows that it may be possible to reduce the risk of hydrate plugging by selecting an appropriate restart rate. The MMS and industry will use the results of this project to reduce the risk of having hydrates stop production restarts.
Hindcast Data on Winds, Waves and Currents in Northern Gulf of Mexico in Hurricanes Katrina and Rita (2005) (Project No. 580)	The study objective is to develop a database of wind, sea state, and currents resulting from Hurricanes Katrina and Rita meteorological data and application of advanced hindcast models. The study contractor has already responded to urgent industry needs for a preliminary assessment of the impact of Hurricanes Katrina and Rita by performing and distributing to several offshore operators an “emergency response (ER)” wind and wave hindcast. The study contractor will make that same data immediately available to the other MMS contracted researchers providing Hurricane Katrina/Rita research then, following completion of the study contractor’s new work, they will deliver a second and more in-depth hindcast data analysis (referred to as “fast response (FR)” that results from this new study. The FR hindcast differs from the ER hindcast and will add to what is known in the following ways: (1) it will use a larger base of measured wind, wave, surge, and current data, (2) it will include a more detailed reanalysis of the wind field; (3) particular attention will be paid to provision of much higher resolution in shallow water and to the inclusion of the storm-perturbed water level in the shallow-water wave hindcast; and (4) more robust 1D and 2D current models will be adopted.
Pipeline Damage Assessment from Hurricane Katrina/Rita (Project No. 581)	The objective of the study is to find out what happened to the GOM pipeline infrastructure during Hurricanes Katrina and Rita and how to be better prepared in the future to reduce hurricane damage in the GOM. The study contractor proposes development of a web-based pipeline damage reporting system with MMS’s eWell system. The intent of the web-based program is to allow operators with options to report their operational status more quickly and efficiently following a major event, plus it allows MMS the means to automate data collection and reporting.
Assessment of Fixed Offshore Platform Performance in Hurricanes Katrina and Rita (Project No. 578)	The objective of this effort is to conduct a qualitative and quantitative assessment of fixed offshore platforms that were affected by Hurricane Katrina and/or Rita. Resulting data will be evaluated to determine if any common trends occur, and also to determine if current API standards are an accurate indicator of expected performance. Coordination and consultation with the API HEAT group will occur throughout the project.

Modeling Waves and Currents Produced by Hurricanes Katrina and Rita (GM-06-x10)	The objective of the study is to assess the response of waves and currents throughout the water column on the northern GOM slope and shelf to Hurricanes Katrina and Rita, using numerical modeling techniques in conjunction with available meteorological and physical oceanographic data. In particular, this study aims at 1. a realistic simulation of circulation throughout the entire water column in the northern GOM continental slope and shelf regions, including the response of currents and waves to Hurricanes Katrina and Rita; 2. determination of the length of time for which substantial ocean response to these hurricanes persisted; and 3. determination of the area or areas of greatest wave height and current speed.
Post-Hurricane Assessment of Sensitive Habitats of the Flower Garden Banks Vicinity (GM-06-x11)	The condition of the communities on the banks selected for the study is important to the health of the ecosystem as a whole. This study will conduct field surveys at the East Flower Garden Bank and at Sonnier, Geyer, and possibly West Flower Garden and McGrail Banks to determine their condition and to track the progress of recovery from Hurricane Rita effects. The study will enhance MMS's ability to distinguish natural from anthropogenic impacts. Results from the study of these banks can be considered representative of others in the area and will improve the MMS's ability to make management decisions.
Impacts of Recent Hurricane Activity on Historic Shipwrecks in the Gulf of Mexico (GM-06-x17)	The objective of this study is to obtain information that will be used to guide decisionmakers in determining how to protect, and manage historic shipwreck sites with respect to MMS's regulatory authority, as required by Section 106 of the National Historic Preservation Act of 1966. This study will also provide decisionmakers with information on what types of impacts can be expected during hurricane activity and how these events affect site size, distribution, and integrity.
Post-Hurricane Assessment of OCS-Related Infrastructure and Communities in the Gulf of Mexico Region (GM-92-42-124)	The primary objective of this project is to update the existing Infrastructure Fact Book in light of the recent changes in the industry and the region. The goal will be a better understanding of the impacts that the 2005 tropical activity may have on future onshore infrastructure development trends and outlooks. A second objective will be to reorganize and supplement some of the information to better support EIS development. In addition to updating the underlying data, the original data documentation will be updated to ensure that the metadata associated with the project meets newer MMS data collection standards that have been developed since the original project concluded. The project will also conduct a socioeconomic analysis of select communities with a high concentration of OCS-related infrastructure. This analysis will take the existing GIS infrastructure information, as well as additions and supplements developed during this project, and identify communities of interest. For a set of 6-10 communities selected, detailed community profiles will be developed using Census data.
Spatial Restructuring and Fiscal Impacts in the Wake of Disaster: The Case of the Oil and Gas Industry Following Hurricanes Katrina and Rita (GM-92-42-125)	The objective of the study is to examine the following research questions: 1. What role will the oil and gas industry play in providing employment stability in the region in the aftermath of the storms, and how will this change over time? 2. Will a spatial shift of employment occur in response to the storms? If so, which areas stand to benefit and which areas stand to suffer from these changes? 3. How will the response of the oil and gas industry compare with other major industrial sectors in terms of its impact on employment and thus the region's recovery? 4. What strategies will the oil and gas industry use to recruit new and retain current employees? 5. What fiscal effects will the industry have on impacted communities, Gulf States, and the Gulf region?

Socioeconomic Responses to Coastal Landloss and Hurricanes: Measuring Resilience Among OCS-Related Coastal Communities in Louisiana (GM-92-42-137)	Study objectives are to 1. develop and compile baseline measures of social-ecological resilience of Louisiana communities facing landloss and hurricane threat; and 2. provide MMS an understanding of resilience levels among communities heavily involved in OCS activities and those that are not and, thereby, strengthen agency social impact analyses.
Gulf Coast Subsidence and Wetland Loss: A Synthesis of Recent Research (GM-92-42-131)	The objective of the study is to conduct an extensive literature review of recent research examining the determining factors of coastal land loss and its implications for exploration and production (E&P) activities in the Outer Continental Shelf (OCS). A descriptive and qualitative approach will be facilitated through the use of recent analyses, reports, and studies from governmental agencies, research institutes, and the private sector. This synthesis of existing research will explore the changing nature of the subsidence debate since Turner and Cahoon's 1988 MMS-funded study *Causes of wetland loss in the coastal Central Gulf of Mexico.* The project will focus on the primary issues associated with coastal subsidence and land loss, with a particular focus on the implications that its occurrence has upon the Gulf coast and the communities and business of the region.
Evaluate Accuracy of Polyester Subrope Damage Detection Performed by Remotely-Operated Vehicles (ROV's) Following Hurricanes and Other Events (Project No. 591) (completed December 5, 2007)	The objectives of the study were to 1. evaluate the accuracy of polyester subrope damage detection performed by ROV's following hurricanes and other events (i.e., Loop Current) that exceed the 100-year design criteria; 2. perform a quantitative evaluation to determine if ROV survey results and resulting life damage estimates are acceptable; 3. explore the viability of a newly conceived method for predicting the remaining life based on adapting traditional methods for the application for synthetic ropes, like polyester; 4. identify non-invasive inspection methods other than ROV surveys and compare ROV inspection with physical insert testing to determine the level of accuracy that can be expected; and 5. identify the most reliable methods, including, but not limited to, insert tests, to verify that the mooring system is fit for its purpose.
Evaluate and Assess the Performance of Jackup Rigs That Were Subject to Hurricanes Katrina or Rita (Project No. 593)	This project will 1. document significant damages to jackups in Hurricanes Katrina and Rita and analyze the cause of jackup casualties with respect to current industry standards; and 2. develop a risk-based checklist on which to base jackup location evaluations to minimize damage to "high consequence" platforms and pipelines as a result of jackup collapse or drifting.
JIP to Quantify Risks in Deepwater Production Facilities and Flowlines in the GOM (Project No. 599)	The objective is to study the quantified risks in deepwater production facilities and flowlines in the GOM. This project proposes to develop an understanding of flow assurance, especially hydrates, where the economic risk management will be the future hydrate flow assurance philosophy. A means to assess the risk in multiple production and restart scenarios is needed.
Stability of Tension-Leg Platforms (TLP's) with Damaged Tendons (Project No. 603)	The primary objective of this project is to investigate the static and dynamic stability of various classes of TLP's under extreme hurricane and Loop Current conditions where one or more tendons have been lost due to damage or disconnect.
Evaluation of Fatigue Life Models and Assessment Practice for Tension-Leg Platforms (Phase 1: Tendon System Fatigue (Project No. 604)	The objective of this project is to evaluate the state of practice in fatigue assessment in the offshore industry today. Of interest is an understanding of how fatigue life calculations are undertaken and how both load and resistance side uncertainties are employed in design for fatigue. The project will be carried out in two phases. In Phase 1, fatigue assessment of TLP tendon systems will be the focus. Phase 2 (to be proposed in the 2008-2009 funding cycle) will address the fatigue of moorings, risers, and connectors.

Cooperative Research on Extreme Seas and Their Impact to Floating Structures (Project No. 605)	This JIP, involving participants from around the world, is expected to develop models for realistic extreme waves and a design methodology for the loading and response of floating platforms used in deepwater areas, such as those of the GOM that now constitute the majority of new OCS development along U.S. borders.
Reliability vs. Consequence of Failure for API Recommended Practice (RP) 2A Platforms Using RP2MET (Project No. 609)	The objective of the study is to determine the structural reliability of a set of approximately 15 GOM platforms of different configurations, water depths, and locations. This set is meant to represent a typical cross section of the GOM fleet of fixed platforms. The resulting platform reliabilities will be compared based upon metocean criteria used – RP2A or 2INT-MET and by region. The results will allow MMS to better understand the impact of the new API criteria on expected platform performance according to design approach used and location in the GOM.
Hurricane Ivan	
Examination and Review of Mobile Offshore Drilling Unit (MODU) Loss of Station-keeping Ability during Hurricane Ivan and Assessment of Current Mooring Standards and Criteria to Prevent Similar Failures (Project No. 548)	The project examined the loss of MODU station-keeping in the Gulf of Mexico during Hurricane Ivan in September 2004, comparing those findings with that of recent Hurricanes Andrew (1992) and Lili (2002), and it assessed the current mooring standards and criteria to prevent similar failures.
Assessment of Fixed Offshore Platforms in Hurricane Ivan, Andrew (Project No. 549)	Based on the damage data collected from Hurricanes Ivan (2004), Andrew (1992), and Lili (2002), this project determined the effectiveness of current structural design standards and MMS regulations. It analyzed the effectiveness of API RP2A and Section 17 to see if both the API standards and MMS regulations performed as expected for the assessment of existing fixed platforms.
A Pilot Study for Regionally-Consistent Hazard Susceptibility Mapping of Submarine Mudslides, Offshore Gulf of Mexico (Project No. 550)	During Hurricane Ivan in 2004, a number of GOM pipelines and platforms were believed to have been impacted by mudslides in the region of Ivan's path. This project provides hazard information for the design and placement of new pipelines and structures by determining the applicability of developing regionally consistent hazard maps that delineate relative susceptibility of GOM offshore regions to future submarine mudslides, including identification of past and future probable locations of underwater slope failures. The project consists of a pilot test to map the seafloor bottom using high-resolution bathymetric and seismic data to delineate past mudslide failures, sediments susceptible to failure, and areas of relative stability. An important part of this mapping is to determine the relative ages of sediment and past failures in order to evaluate where future failures are most likely to occur, and equally important, likely to not occur.
Assessment of Drilling and Workover Rig Storm Sea Fastenings on Offshore Floating Platforms During Hurricane Ivan (Project No. 551)	Drilling and workover rigs on floating production systems (FPS's) are held to the decks by sea fastenings to prevent movement during hurricanes. During Hurricane Ivan, a number of drilling or workover rigs shifted. These movements are assessed, along with the current design philosophy and criteria for storm sea fastenings, rig and storm sea fastening installation practices, and onboard storm operational practices to ready FPS's for a hurricane. The study's results provide information that can be used to assess any needs to revise tie-down criteria or practices.
Mudslides during Hurricane Ivan and an Assessment of the Potential for Future Mudslides in the GOM (Project No. 552)	During 2004 and 2005, Hurricanes Ivan, Katrina, and Rita damaged and destroyed hundreds of GOM pipelines and platforms, many from mudslides both in line with and adjacent to the hurricanes' paths. This project examines and reviews the mudflow/mudslide areas in the GOM caused by hurricanes. Revised and/or new maps indicating areas of high risk were produced. This will be accomplished through a review of both historical data, as well as new data that resulted from Hurricanes Ivan, Katrina, and Rita.

Pipeline Damage Assessment from Hurricane Ivan (Project No. 553)	In September 2004, Hurricane Ivan, a Category 4 hurricane, moved through the GOM with winds and waves that exceeded the 100-year storm design criteria of offshore facilities. Approximately 10,000 mi of pipelines were in the direct path of Hurricane Ivan. The MMS received industry damage assessment reports identifying damage to the offshore pipeline infrastructure. This project determined the type, cause, and extent of pipeline damage incurred during Hurricane Ivan and provides guidance for improving pipeline integrity/design to reduce potential damage from future GOM hurricanes.
Offshore Hurricane Readiness & Recovery Conference (Project No. 559)	The Offshore Hurricane Readiness & Recovery Conference, co-sponsored by MMS, was held July 26-27, 2005, in Houston, Texas. The conference brought industry and government officials together to share and learn from the experiences of Hurricane Ivan to improve future performance and reliability of offshore operations in the GOM.
Ocean Currents under Hurricane Ivan on the Mississippi/Alabama Shelf (GM-05-x12)	The purpose of this interagency agreement was to analyze vertical profiles of ocean currents prior to, during, and after the passage of Hurricane Ivan to assess the response of the ocean to such an energetic atmospheric event. In particular, a 3-dimensional response of ocean currents was sought by the Naval Research Laboratory research team.
Hurricane Lili	
Validation and Calibration of API RP2A Using Hurricane Lili to Update the Hurricane Andrew Joint Industry Project (JIP) Results that Provided the Basis for API Section 17 (Project No. 466)	This project updates the API RP2A section using Hurricane Lili data to validate and calibrate Hurricane Andrew's JIP results. The general project objectives were to 1. determine the validity of the API RP2A process using a combined set of Hurricane Andrew and Hurricane Lili data; 2. determine the anticipated conservatism of the API process, if any, by determining the bias factors for the jacket and foundation; 3. identify the areas of the API design process, wave load, foundation design, etc., that provide the most significant bias contributors; and 4. make recommendations on improvements to API RP2A.
Hindcast Study of Winds, Waves, and Currents in Northern GOM in Hurricane Lili (2002) (Project No. 467)	The purpose of this study was to develop a description of the evolution and distribution of the surface wind field, wave, salinity, sea-surface temperature, and current field in the northern GOM during the approach and passage of Hurricane Lili in 2002. The hindcast used all available public domain meteorological and oceanographic measured data, and Oceanweather's most accurate cyclone wind and wave hindcast methods. Hindcast results are validated against available measured data and an assessment of the accuracy of the hindcast provided with the results. The narrative report includes a description of the data sources, storm evolution (track and intensity), wind and wave hindcast method and a summary of results.
Post-Mortem Failure Assessment of Drilling Rigs during Hurricane Lili (Project No. 469)	The project studied the failures of offshore drilling rigs, MODU's, and jackup rigs associated with the passage of Hurricane Lili in the autumn of 2002. It developed recommendations for updates on criteria, reviewed data from the Hurricane Andrew timeframe, and the made recommendations to SNAME RP for possible future mitigation action.
Assessment of Performance of Deepwater Floating Production Facilities (Project No. 471)	This project collected and assessed information on the performance of deepwater production facilities that were impacted by Hurricane Lili (2002). This study formed the basis for developing recommendations for improvement in design and operation of installations such as 1. vortex-induced vibration of risers; 2. loss of air gap with wave loading on decks; 3. TLP performance; and 4. spar performance measurements.

Evaluate and Compare Hurricane-Induced Damage to Offshore Pipelines for Hurricane Lili – Rev. A (Project No. 503)	This project investigated the major classes of pipeline failure that resulted to GOM OCS facilities by Hurricane Lili in the fall of 2002. The project had four objectives: 1. investigate pipeline failures resulting from Hurricane Lili, including flowlines, major trunk lines, and platform risers from both fixed and floating production facilities; 2. compare and contrast these failures with those reported from Hurricane Andrew; 3. make specific recommendations for changes in design or operations guidelines that might prevent or mitigate such failures in the future; and 4. suggest cost-effective methods for making existing pipelines designed by older guidelines less likely to fail in the future.
Hurricane Andrew	
Study and Hindcast of Wind and Wave Fields for Hurricane Andrew (Project No. 193)	This study was a JIP to describe the evolution and distribution of the surface wind field and wave field in the northern GOM during Hurricane Andrew in August 1992. The hindcast used public domain meteorological and oceanographic measured data and the Oceanweather's most accurate cyclone wind and wave hindcast methods. The narrative report includes a description of the data sources, storm evolution (track and intensity), hindcast method, and a summary of results.
Hurricane Andrew Calibration Study (Project No. 199)	This study was a JIP to collect information gained from platform failures and survivals during Hurricane Andrew and to develop a database for the future management of existing platforms. The MMS, through its Platform Verification Program, is responsible for a wide variety of functions related to the strength and integrity of offshore platforms. This project incorporates a "calibration" task that uses the outcome of Hurricane Andrew (survived, damaged, or failed platforms) to update and adjust, where necessary, current practices for assessing in-place offshore platforms. This calibrated approach could become part of a future API RP2A recommendation for assessing existing offshore platforms.
Performance of Safety and Pollution Control Devices in the Aftermath of Hurricane Andrew (Part of the Hurricane Andrew OCS Damage Assessment Program) (Project No. 203)	The objective of this project was to develop a reliability database that will increase the confidence in the methodology used to develop safety systems, thereby increasing the safety of offshore developments. The basis of achieving the objectives of this work was to secure the support of operators associated with MMS to ease the gathering of data related to the performance of safety and pollution control devices within the offshore environment. These data were collated into a computer database and used as input to the review of reliability assessment methodology and the performance of test case analysis.
Post Mortem Platform Failure Evaluation Study (Project No. 204)	This study was a JIP that used the results of Hurricane Andrew to evaluate engineering methods for predicting platform failure or survivability by comparing screening analysis and/or detailed failure analysis against actual field data (i.e., platforms that were exposed to Andrew and either survived, collapsed, or were damaged). In addition, the study also examined the concept of a formal Offshore Platform Evaluation System as a management information system.
Shallow Water Wave and Current Field Study (Project No. 206)	The study provides a comprehensive and reliable database of environmental data in shallow-water (as well as offshore) areas affected by Hurricane Andrew through the implementation and application of advanced numerical wave and current hindcast models. The models adopted were previously applied and validated against historical GOM hurricanes. These were carefully checked and recalibrated against available data acquired in Hurricane Andrew.
API/Hurricane Foundation Study (Project No. 207)	The study is a JIP to develop separate bias factors for evaluation of pile foundations of GOM offshore steel jackets based upon their performance during Hurricane Andrew. Some similarly limited studies were performed for caisson structures. The purpose of the study is to evaluate possible conservatism in the current API RP2A foundation design recipe.

Development of Acceptance Criteria for Caisson Structures Damaged during Hurricane Andrew (Project No. 209)	Approximately 100 caisson structures were tilted during Hurricane Andrew. The objective of this study was to develop an acceptance criteria for those tilted structures and to develop guidelines for straightening those structures that did not meet the criteria.
Hurricane Andrew Effects on Offshore Platforms (Project No. 210)	This study was a JIP to inspect and analyze three Chevron platforms in their South Timbalier field. Two structures survived Hurricane Andrew; the other toppled during the hurricane. The objective of the study was to compare analytical predictions with actual field performance, with particular emphasis on individual members and platform system failures. This assessment provided information in developing guidelines to be incorporated into API RP2A.
Dynamic Nonlinear Loading Effects on Offshore Platforms (Project No. 224)	The project's objective was to conduct parametric studies of the dynamic response of reduced degrees of freedom nonlinear systems and to determine how the results from simplified nonlinear capacity analysis relate to the results from complex time-domain analysis of the performance of platforms in extreme condition storms. Observed platform performances during recent hurricanes (e.g., Andrew, Camille, Betsy, and Hilda) were used to verify the analysis. Engineering guidelines were developed to define dynamic nonlinear loading-capacity effects on the overall performance characteristics of platforms.
Hurricane Andrew Effects on Offshore Platforms (Phase II - JIP) (Project No. 229)	The study was a JIP. Phase I was a calibration task to study the effects of Hurricane Andrew on platforms (i.e., survived, damaged, or failed). The outcomes were used to update current practices for assessing the ability of in-place platforms to withstand hurricanes. This calibration approach became part of API's RP2A standard for assessing existing offshore platforms.

KEYWORD INDEX

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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 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 territories under U.S. administration.

The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The MMS **Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.