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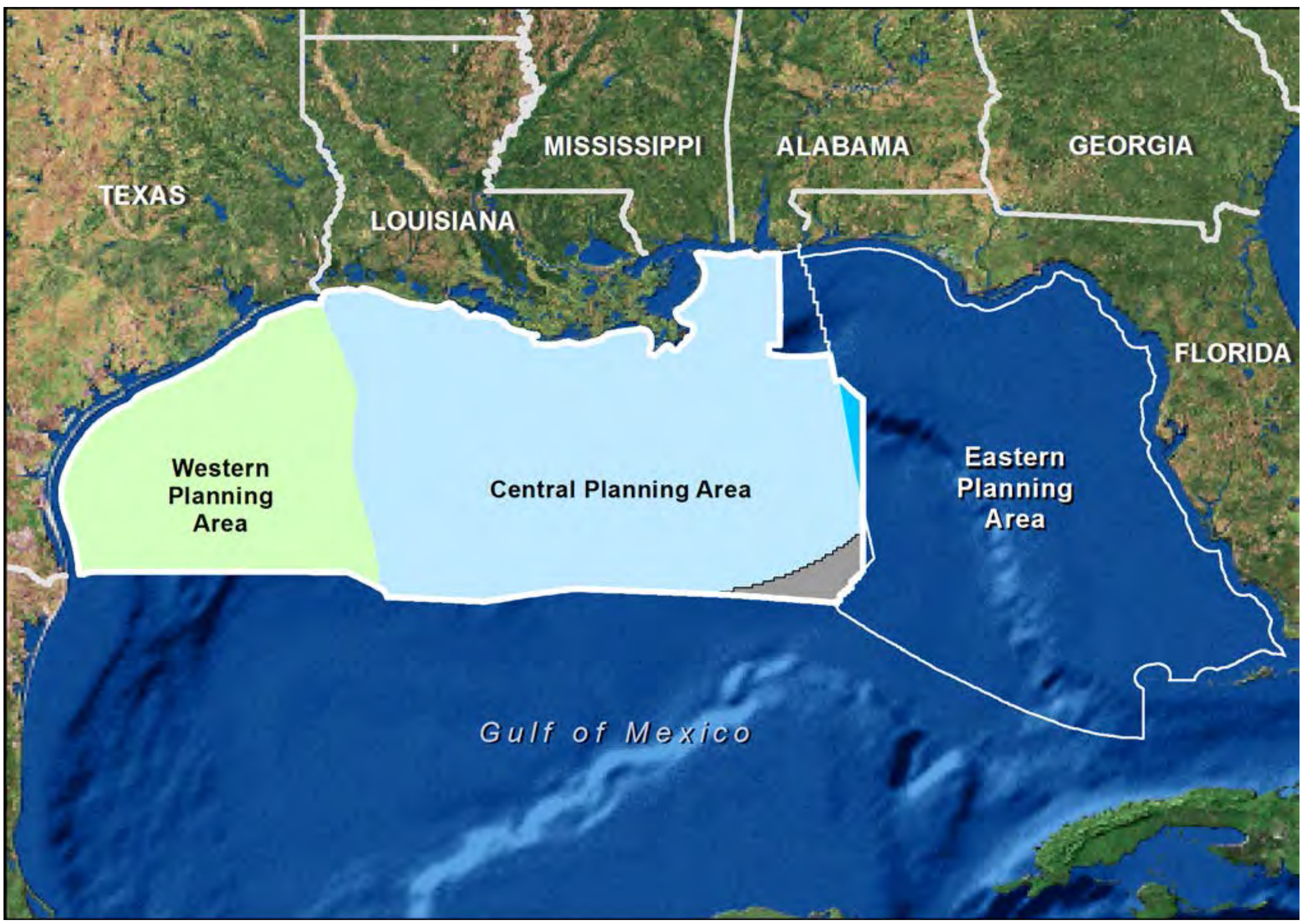
Final Multisale Environmental Impact Statement

Volume III: Appendices and Keyword Index



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

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APPENDIX A

POSTLEASE PERMITTING AND APPROVAL PROCESSES

A POSTLEASE PERMITTING AND APPROVAL PROCESSES

BOEM is responsible for managing the development of the Nation's offshore energy and mineral resources in an environmentally and economically responsible way. The functions of BOEM include leasing, exploration and development plan administration, geological and geophysical permitting, environmental studies, NEPA analysis, resource evaluation, economic analysis, marine minerals, and renewable energy development. BOEM's regulations for oil, gas, and sulphur lease operations are specified in 30 CFR parts 556, 550, 551 (except those aspects that pertain to drilling), and 554.

The BSEE is responsible for enforcing safety and environmental regulations. The functions of BSEE include all field operations, including permitting and research, inspections, offshore regulatory programs, oil-spill response, and training and environmental compliance functions. The BSEE's regulations for oil, gas, and sulphur operations are specified in 30 CFR parts 250 and 254.

Measures to minimize potential impacts are an integral part of the OCS Program. These measures are implemented through lease stipulations, operating regulations, NTLs, and project-specific requirements or approval conditions that are applied to all plans for OCS oil- and gas-related activities (e.g., exploration and development plans, pipeline applications, and structure-removal applications). These measures address concerns such as endangered and threatened species, geologic and manmade hazards, military warning and ordnance disposal areas, archaeological sites, air quality, oil-spill response planning, chemosynthetic communities, artificial reefs, operations in hydrogen sulfide (H_2S) prone areas, and shunting of drill effluents in the vicinity of biologically sensitive features. Refer to **Appendix B** ("Commonly Applied Mitigating Measures") for more information on the mitigations that BOEM and BSEE could apply at the postlease stage. Standard mitigating measures in the Gulf of Mexico OCS include the following:

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

BOEM and BSEE issue NTLs 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 NTLs is available through BOEM's and BSEE's Gulf of Mexico OCS Region websites (http://www.boem.gov/notices-to-lessees-and-operators/ and http://www.bsee.gov/Regulations-and-Guidance/Notices-to-Lessees-and-Operators/) or through the Region's Public Information Office at 1-800-200-GULF.

Formal plans must be submitted to BOEM for review and approval before any project-specific activities, except for ancillary activities (such as geological and geophysical activities or studies that model potential oil and hazardous substance spills), can begin on a lease. Conditions of approval are mechanisms to control or mitigate potential safety or environmental problems associated with proposed operations. Conditions of approval are based on BOEM's technical and environmental evaluations of the proposed operations. Comments from Federal and State agencies (as applicable) are also considered in establishing conditions. Conditions may be applied to any OCS plan, permit, right-of-use of easement, or pipeline right-of-way grant.

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

The following postlease approval processes apply to the proposed lease sale areas in the WPA, CPA, and EPA.

A.1 Geological and Geophysical Survey Authorizations

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

Ancillary activities, or G&G exploration and development activities conducted on lease, are defined in 30 CFR § 250.105 and 30 CFR § 550.105 with regulations outlined in 30 CFR §§ 550.207 through 550.210. Ancillary activities include geological and high-resolution geophysical, geotechnical, archaeological, biological, physical oceanographic, meteorological, socioeconomic, or other surveys; or various types of modeling studies. This Agency issued NTL 2009-G34, "Ancillary Activities," to provide guidance and clarification on conducting ancillary activities in BOEM's Gulf of Mexico OCS Region. Operators should notify the Gulf of Mexico OCS Region, Regional Supervisor, Office of Leasing and Plans, Plans Section, in writing 30 days in advance before conducting any of the following types of ancillary activities related to a G&G exploration or development G&G activity:

- involving the use of an airgun or airgun array anywhere in the GOM regardless of water depth;
- independent of water depth, involving the use of explosives as an energy source; and
- independent of water depth, including ocean-bottom cable surveys, node surveys, and time-lapse (4D) surveys.

Additionally, NTL 2009-G34 clarifies that the Gulf of Mexico OCS Region, Regional Supervisor, Office of Leasing and Plans, Plans Section, should be notified in writing 15 days in advance before conducting the following types of other ancillary activities:

- involving the use of an airgun or airgun array anywhere in the EPA of the GOM regardless of water depth and 200 m (656 ft) or greater for the rest of the GOM;
- involving bottom disturbance, independent of water depth, including ocean-bottom cable surveys, node surveys, and time-lapse (4D) surveys; and
- a geotechnical evaluation involving piston/gravity coring or the recovery of sediment specimens by grab sampling or similar technique and/or any dredging or other ancillary activity that disturbs the seafloor (including deployment and retrieval of bottom cables, anchors, or other equipment).

This NTL also provides guidance for each type of ancillary activity, the type and level of BOEM review, and follow-up, post-survey report requirements.

Shallow hazard assessments are required under 30 CFR §§ 550.214 and 50.244; NTL 2008-G05, “Shallow Hazards Program,” explains the requirements for these surveys and their reports. Included in shallow hazard assessments is a structural and stratigraphic interpretation of seismic data to qualitatively delineate abnormal pressure zones, shallow free gas, seafloor instability, shallow waterflow, and gas hydrates.

Seismic surveys are performed to obtain information on surface and near-surface geology and on subsurface geologic formations. Low-energy, high-resolution seismic surveys collect data on surficial geology used to identify potential shallow geologic or manmade hazards (e.g., faults or pipelines) for engineering and site planning for bottom-founded structures. The high-resolution surveys are also used to identify environmental and archaeological resources such as low-relief live bottom areas, pinnacles, chemosynthetic community habitat, and shipwrecks. High-energy, deep-penetration, common-depth-point (CDP) seismic surveys obtain data about geologic formations thousands of feet below the seafloor. The two-dimensional (2D) and three-dimensional (3D) CDP data are used to map structure features of stratigraphically important horizons in order to identify potential hydrocarbon traps. They can also be used to map the extent of potential habitat for chemosynthetic communities. In some situations, a set of 3D surveys can be run over a time interval to produce a four-dimensional (4D), or “time-lapse,” survey that could be used to characterize production reservoirs.

BOEM’s predecessor completed the *Geological and Geophysical Exploration for Mineral Resources on the Gulf of Mexico Outer Continental Shelf: Programmatic Environmental Assessment* (G&G Programmatic EA) (USDOI, MMS, 2004). Upon receiving a complete G&G permit application, BOEM conducts a NEPA review that will result in a categorical exclusion, an EA, or an EIS in accordance with the G&G Programmatic EA’s conclusions, NEPA guidelines, and other applicable BOEM policies. When required under an approved coastal management program, proposed G&G permit activities must receive State concurrence prior to BOEM permit approval.

A.2 Exploration and Development Plans

To ensure compliance with the OCSLA, other laws, applicable regulations, and lease provisions, and to enable BOEM to carry out its functions and responsibilities, formal plans (30 CFR §§ 550.211 and 550.241) with supporting information must be submitted for review and approval by BOEM before an operator may begin exploration, development, or production activities on any lease. Supporting environmental information, archaeological reports, biological reports (monitoring and/or live-bottom survey), and other environmental data determined necessary must be submitted with an OCS plan. This information provides the basis for an analysis of both offshore and onshore impacts that may occur as a result of the activities. BOEM may require additional specific supporting information to aid in the evaluation of the potential environmental impacts of the proposed activities. BOEM can require an amendment of an OCS plan based on inadequate or inaccurate supporting information. The 30 CFR part 550 subpart B regulations were revised to update the information that must be submitted with OCS plans and were published in the *Federal Register* on August 30, 2005 (*Federal Register*, 2005).

The OCS plans are reviewed by subject-matter experts that include, but are not limited to geologists, geophysicists, engineers, biologists, archaeologists, air quality specialists, water quality specialists, oil-spill specialists, NEPA coordinators, and/or environmental scientists. The plans and accompanying information are evaluated to determine whether any seafloor or drilling hazards are present; that air and water quality issues are addressed; that plans for hydrocarbon resource conservation, development, and drainage are adequate; that environmental issues and potential impacts are properly evaluated and mitigated; and that a proposed action is in compliance with NEPA, the Coastal Zone Management Act, BOEM’s operating regulations, and other requirements. Federal agencies, including FWS, NMFS, USEPA, U.S. Navy, U.S. Air Force, and USCG, may be consulted if the proposal has the potential to impact areas under their jurisdiction. Each Gulf Coast State has a designated CZM agency that takes part in the review process. The OCS plans are also made available to the general public for comment through BOEM’s Gulf of Mexico OCS Region’s Public Information Office.

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

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

Exploration Plans

An exploration plan (EP) must be submitted to BOEM for review and approval before any exploration activities, except for preliminary activities (such as hazard surveys or geophysical surveys), can begin on a lease. The EP describes exploration activities, drilling rig or vessel, proposed drilling and well-testing operations, environmental monitoring plans, and other relevant information, and it includes a proposed schedule of the exploration activities. Guidelines and environmental information requirements for lessees and operators submitting an EP are addressed in 30 CFR § 550.211 and are further explained in NTL 2008-G05, "Shallow Hazards Program," and NTL 2009-G27, "Submitting Exploration Plans and Development Operations Coordination Documents." The NTL 2008-G04 provides guidance on information requirements and establishes the contents for OCS plans required by 30 CFR part 550 subpart B. The NTL 2015-BOEM-N01, "Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS for Worst Case Discharge and Blowout Scenarios," effective January 14, 2015, supersedes NTL 2010-N06. The NTL 2009-G27 clarifies guidance for submitting OCS plans to BOEM's Gulf of Mexico OCS Region.

After receiving an EP, BOEM determines if the plan is complete and adequate before technical and environmental reviews. BOEM evaluates the proposed exploration activities for potential impacts relative to geohazards and manmade hazards (including existing pipelines), archaeological resources, endangered species, sensitive biological features, water and air quality, oil-spill response, State CZMA requirements, and other uses (e.g., military operations) of the OCS. The EP is reviewed for compliance with all applicable laws and regulations.

A site-specific environmental review (SSER) is generated and completed for each plan. As a result of the SSER, a determination is made whether a categorical exclusion can be applied or whether additional NEPA analysis in the form of an EA or EIS will be prepared for the proposed activity. Categorical exclusions are "a category of actions which do not individually or cumulatively have a significant effect on the human environment and for which, therefore, neither an environmental assessment nor an environmental impact statement is required" (40 CFR § 1508.4). In the event an action cannot be categorically excluded, the decision to prepare an EA will be made by the Regional Supervisor, Leasing and Environment or the Chief, Environmental Division. The SSER is based on the best available information, which may include the geophysical report (for determining the potential for the presence of deepwater benthic communities); archaeological report; air emissions data; waste and discharge data; live-bottom survey and report; biological monitoring plan; and recommendations by the affected State(s), DOD, FWS, NMFS, and/or internal BOEM offices. As part of the review process, each EP must contain a certification of consistency and the necessary data and information for the State to determine that the proposed activities comply with the enforceable policies of the States' approved Coastal Management Plan (CMP) and that such activities will be conducted in a manner that is consistent with the CMP (16 U.S.C. § 1456(c)(3)(A) and 15 CFR § 930.76).

If the EP is approved, and prior to conducting drilling operations, the operator is required to submit and obtain approval for an Application for Permit to Drill (APD) (refer to Wells under Permits and Applications below).

Operations Plans

In 1992, this Agency formed an internal Deepwater Task Force to address technical issues and regulatory concerns relating to deepwater (>1,000 ft; 305 m) operations and projects utilizing subsea technology. Based on the Deepwater Task Force's recommendation, an NTL (2000-N06) was at first developed that was incorporated into 30 CFR part 550 subpart B. The revisions to subpart B were finalized August 30, 2005, and it requires operators to submit a Deepwater Operations Plan (DWOP) for all operations in deep water (400 m [1,312 ft] or greater) and all projects using subsea technology. DeepStar, an industry-wide cooperative workgroup focused on deepwater regulatory issues and critical technology development issues, worked closely with this Agency's Deepwater Task Force to develop the initial guidelines for the DWOP. The DWOP requirement was established to address regulatory issues and concerns that were not addressed in the Agency's then-existing regulatory framework, and it is intended to initiate an early dialogue between BSEE and industry before major capital expenditures on deepwater and subsea projects are committed. Deepwater technology has been evolving faster than BSEE's ability to revise OCS regulations; the DWOP was established through the NTL process, which provides for a more timely and flexible approach to provide guidance on regulatory requirements and keep pace with the expanding deepwater operations and subsea technology.

The DWOP is intended to address the different functional requirements of production equipment in deep water, particularly the technological requirements associated with subsea production systems, and the complexity of deepwater production facilities. The DWOP provides BSEE with information specific to deepwater equipment issues to demonstrate that a deepwater project is being developed in an acceptable manner as mandated in the OCSLA, as amended, and

BSEE's operating regulations at 30 CFR part 250. The BSEE reviews deepwater development activities from a total system perspective, emphasizing operational safety, environmental protection, and conservation of natural resources. The DWOP process is a phased approach that parallels the operator's state of knowledge about how a field will be developed. A DWOP outlines the design, fabrication, and installation of the proposed development/production system and its components. A DWOP will include structural aspects of the facility (i.e., fixed, floating, or subsea); station-keeping (includes mooring system); wellbore, completion, and riser systems; safety systems; product removal or offtake systems; and hazards and operability of the production system. The DWOP provides BSEE with the information to determine that the operator has designed and built sufficient safeguards into the production system to prevent the occurrence of significant safety or environmental incidents. The DWOP, in conjunction with other permit applications, provides BSEE the opportunity to assure that the production system is suitable for the conditions in which it will operate.

This Agency recently completed a review of several industry-developed, recommended practices that address the mooring and risers for floating production facilities. The recommended practices address such things as riser design, mooring system design (station-keeping), and hazard analysis. Hazard analyses allow BSEE to be assured that the operator has anticipated emergencies and is prepared to address them, either through their design or through the operation of the equipment in question. The BSEE released these clarifications of its requirements in NTL's: NTL 2009-G03, "Synthetic Mooring Systems"; NTL 2009-G11, "Accidental Disconnect of Marine Drilling Risers"; and NTL 2009-G13, "Guidelines for Tie-downs on OCS Production Platforms for Upcoming Hurricane Seasons."

Conservation Reviews

One of BOEM and BSEE's primary responsibilities is to ensure development of economically producible reservoirs according to sound resource conservation, engineering, and economic practices as cited in 30 CFR §§ 550.202(c), 550.203, 550.210, 550.296, 550.297, 550.298, 550.299, 250.204, and 250.205. Operators should submit the necessary information as part of their EP, initial and supplemental development operations and coordination documents (DOCDs) or development and production plans (DPPs), and Conservation Information Document. Conservation reviews are performed to ensure that economic reserves are fully developed and produced, and that there is no harm to the ultimate recovery.

Development Operations and Coordination Documents and Development and Production Plans

Before any development operations can begin on a lease in a proposed lease sale area, a DOCD/DPP must be submitted to BOEM for review and decision. A DOCD/DPP describes the proposed development activities, drilling activities, platforms or other facilities, proposed production operations, environmental monitoring plans, and other relevant information; and it includes a proposed schedule of development and production activities. Requirements for lessees and operators submitting a DOCD/DPP are addressed in 30 CFR §§ 550.241 and 550.242, and information guidelines for DOCDs/DPPs are provided in NTLs 2008-G04, 2009-G27, and 2010-N06.

After receiving a DOCD/DPP, BOEM performs technical and environmental reviews. BOEM evaluates the proposed activity for potential impacts relative to geohazards and manmade hazards (including existing pipelines), archaeological resources, endangered species, sensitive biological features, water and air quality, oil-spill response, State CMPs requirements, and other uses (e.g., military operations) of the OCS. The DOCD/DPP is reviewed for compliance with all applicable laws and regulations.

A SSER is generated and completed for each DOCD/DPP. As a result of the SSER, a determination is made whether a categorical exclusion can be applied or whether additional NEPA analysis in the form of an EA or EIS will be prepared for the proposed activity. The environmental review is based on the best available information, which may include the geophysical report (for determining the potential for the presence of deepwater benthic communities); archaeological report; air emissions data; waste and discharge data, live-bottom survey and report; biological monitoring plan; and recommendations by the affected State(s), DOD, FWS, NMFS, and/or internal BOEM offices.

As part of the review process, each DOCD/DPP must contain a certification of consistency and the necessary data and information for the State to determine that the proposed activities comply with the enforceable policies of the States' approved CMP and that such activities will be conducted in a manner that is consistent with the CMP (16 U.S.C. § 1456(c)(3)(A) and 15 CFR § 930.76).

New or Unusual Technologies

Technologies continue to evolve to meet the technical, environmental, and economic challenges of deepwater development. New or unusual technologies (NUTs) may be identified by the operator in its EP, DWOP, and DOCD/DPP or through BOEM's plan review processes. Some of the technologies proposed for use by the operators are actually extended applications of existing technologies and interface with the environment in essentially the same way as well-known or conventional technologies. These technologies are reviewed by BOEM for alternative compliance or departures that may trigger additional environmental review. Some examples of new technologies that do not affect the environment differently and that are being deployed in the OCS Program are synthetic mooring lines, subsurface safety devices, and multiplex subsea controls.

Some new technologies differ from established technologies in how they function or interface with the environment. These include equipment or procedures that have not been installed or used in Gulf of Mexico OCS waters. Having no operational history, they have not been assessed by BOEM through technical and environmental reviews. New technologies may be outside the framework established by BOEM's regulations and, thus, their performance (safety, environmental protection, efficiency, etc.) has not been addressed by BOEM. The degree to which these new technologies interface with the environment and the potential impacts that may result are considered in determining the level of NEPA review that would be initiated.

BOEM has developed a NUTs' matrix to help facilitate decisions on the appropriate level of engineering and environmental review needed for a proposed technology. Technologies will be added to the NUTs' matrix as they emerge, and technologies will be removed from the matrix as sufficient experience is gained in their implementation. From an environmental perspective, the matrix characterizes new technologies into three categories: technologies that may affect the environment; technologies that do not interact with the environment any differently than "conventional" technologies; and technologies about which BOEM does not have sufficient information to determine their potential impacts to the environment. In this latter case, BOEM will seek to gain the necessary information from operators or manufacturers regarding the technologies to make an appropriate determination on potential effects on the environment.

Alternative Compliance and Departures

The BSEE's project-specific engineering safety review ensures that equipment proposed for use is designed to withstand the operational and environmental conditions in which it would operate. When an OCS operator proposes the use of new or unusual technology or procedures not specifically addressed in established BSEE regulations, the operations are evaluated for alternative compliance or departure determination. Any new technologies or equipment that represents an alternative compliance or departure from existing BSEE regulations must be fully described and justified before they would be approved for use. For BSEE and BOEM to grant alternative compliance or departure approval, the operator must demonstrate an equivalent or improved degree of protection as specified in 30 CFR § 250.141 and 30 CFR § 550.141. Comparative analysis with other approved systems, equipment, and procedures is one tool that BSEE uses to assess the adequacy of protection provided by alternative technology or operations. Actual operational experience is necessary with alternative compliance measures before BSEE would consider them as proven technology.

Emergency Plans

Criteria, models, and procedures for shutdown operations and the orderly evacuation of platforms and rigs for an impending hurricane have been in place in the Gulf of Mexico OCS for more than 30 years. (Such emergency plans are different from the oil-spill response plans described later in this chapter.) Operating experience from extensive drilling activities and more than 4,000 platforms during the 50-plus years of the Gulf of Mexico OCS Program have demonstrated the effectiveness and safety of securing wells and evacuating a facility in advance of severe weather conditions. Preinstallation efforts, historical experience with similar systems, testing, and the actual operating experience (under normal conditions and in response to emergency situations) are used to formulate the exact time needed to secure the wells and production facility and to evacuate it as necessary. Operators develop site-specific curtailment, securing, and evacuation plans that vary in complexity and formality by operator and type of activity. In general terms, all plans are intended to make sure the facility (or well) is secured in advance of an impending storm or developing emergency. The operating procedures developed during the engineering, design, and manufacturing phases of the project, coupled with the results (recommended actions) from hazard analyses performed, are used to develop the emergency action and curtailment plans. Evacuation and production curtailment must consider a combination of factors, including the well status (drilling, producing, etc.) and the type and mechanics of wellbore operations. These factors are analyzed onsite through a decisionmaking process that involves onsite facility managers. The emphasis is on making real-time, situation-specific decisions and forecasting based on available information. Details of the shut-in criteria and various alerts are addressed on a case-by-case basis, as explained below.

Plans for shutting in production from the subsea wells are addressed as part of the emergency curtailment plan. The plan specifies the various alerts and shutdown criteria linked to both weather and facility performance data, with the intent to have operations suspended and the wells secured in the event of a hurricane or emergency situation. Ensuring adequate time to safely and efficiently suspend operations and secure the well is a key component of the planning effort. Clearly defined responsibilities for the facility personnel are part of the successful implementation of the emergency response effort.

For a severe weather event such as a hurricane, emergency curtailment plans would address the criteria and structured procedures for suspending operations and ultimately securing the wellbore(s) prior to weather conditions that could exceed the design operating limitations of the drilling or production unit. For drilling operations, the plan might also address procedures for disconnecting and moving the drilling unit off location after the well has been secured, should the environmental conditions exceed the floating drilling unit's capability to maintain station. Curtailment of operations consists of various stages of "alerts" indicating the deterioration of meteorological, oceanographic, or wellbore conditions. Higher alert levels require increased monitoring, the curtailment of lengthy wellbore operations, and, if conditions warrant, the eventual securing of the well. If conditions improve, operations could resume based on the limitations established in the contingency plan for the known environmental conditions. The same emergency curtailment plans would be implemented in an anticipated or impending emergency situation, such as the threat of a terrorist attack.

Neither BSEE nor USCG mandates that an operator must evacuate a production facility for a hurricane; it is a decision that rests solely with the operator. The USCG does require the submittal of an emergency evacuation plan that addresses the operator's intentions for evacuation of nonessential personnel, egress routes on the production facility, lifesaving and personnel safety devices, firefighting equipment, etc. As activities move farther from shore, it may become safer to not evacuate the facility because helicopter operations become inherently more risky with greater flight times. Severe weather conditions also increase the risks associated with helicopter operations. The precedent for leaving a facility manned during severe weather is established in the North Sea and other operating basins.

Redundant, fail-safe, automatic shut-in systems located inside the wellbore and at the sea surface, and in some instances at the seafloor, are designed to prevent or minimize pollution. These systems are designed and tested to ensure proper operation should a production facility or well be catastrophically damaged. Testing occurs at regular intervals with predetermined performance limits designed to ensure functioning of the systems in case of an emergency.

After the *Deepwater Horizon* explosion, oil spill, and cleanup, the testing requirements for well control systems came under immediate scrutiny in the DOI Secretary's *Increased Safety Measures for Energy Development on the Outer Continental Shelf* (Safety Measures Report), which was delivered on May 27, 2010 (USDOI, 2010). The Safety Measures Report included a recommendation of a program for immediate recertification of blowout preventers (BOPs). As stated above, the new regulatory section at 30 CFR § 250.451(i) requires that, if a blind-shear ram or casing shear ram is activated in a well control situation where the pipe is sheared, the BOP stack must be retrieved, fully inspected, and tested.

A.3 Permits and Applications

After the approval of an EP or DOCD/DPP, the operator submits applications for specific activities to BOEM for approval. These applications include those for drilling wells; well-test flaring; temporary well abandonment; installing a well protection structure, production platforms, satellite structures, subsea wellheads and manifolds, and pipelines; installation of production facilities; commencing production operations; platform removal and lease abandonment; and pipeline decommissioning.

Wells

The BSEE requirements for the drilling of wells can be found at 30 CFR part 250 subpart D. Lessees are required to take precautions to keep all wells under control at all times. The lessee must use the best available and safest technology to enhance the evaluation of abnormal pressure conditions and to minimize the potential for uncontrolled well flow.

Prior to conducting drilling operations, the operator is required to submit and obtain approval for an Application for Permit to Drill (APD). The APD requires detailed information (including project layout at a scale of 1:24,000, design criteria for well control and casing, specifications for blowout preventers, a mud program, cementing program, directional drilling plans, etc.) to allow for BOEM's evaluation of operational safety and pollution-prevention measures. The APD is reviewed for conformance with the engineering requirements and other technical considerations.

The BSEE is responsible for conducting technical and safety reviews of all drilling, workover, and production operations on the OCS. These detailed analyses determine if the lessee's proposed operation is in compliance with all regulations and all current health, safety, environmental, and classical engineering standards.

The BSEE regulations at 30 CFR §§ 250.1710-1717 address the requirements for permanent abandonment of a well on the OCS. A permanent abandonment includes the isolation of zones in the open wellbore, plugging of perforated intervals, plugging the annular space between casings (if they are open), setting a surface plug, and cutting and retrieving the casing at least 15 ft (5 m) below the mudline. All plugs must be tested in accordance with the regulations. There are no routine surveys of permanently abandoned well locations. If a well were found to be leaking, BOEM would require the operator of record to perform an intervention to repair the abandonment. If a well is temporarily abandoned at the seafloor, an operator must provide BSEE with an annual report summarizing plans to permanently abandon the well or to bring the well into production.

Platforms and Structures

The BSEE does a technical review of all proposed structure designs and installation procedures. All proposed facilities are reviewed for structural integrity. These detailed engineering reviews entail an evaluation of all operator proposals for fabrication, installation, modification, and repair of all mobile and fixed structures. The lessee must design, fabricate, install, use, inspect, and maintain all platforms and structures on the OCS to assure their structural integrity for the safe conduct of operations at specific locations. Applications for platform and structure approval are filed in accordance with 30 CFR § 250.901. Design requirements are presented in detail at 30 CFR §§ 250.904 through 250.909. The lessee evaluates characteristic environmental conditions associated with operational functions to be performed. Factors such as waves, wind, currents, tides, temperature, and the potential for marine growth on the structure are considered. In addition, pursuant to 30 CFR §§ 250.902 and 250.903, a program has been established by BSEE to assure that new structures meeting the conditions listed under 30 CFR § 250.900(c) are designed, fabricated, and installed using standardized procedures to prevent structural failures. This program facilitates review of such structures and uses third-party expertise and technical input in the verification process through the use of a Certified Verification Agent. After installation, platforms and structures are required to be periodically inspected and maintained under 30 CFR § 250.912.

Pipelines

Regulatory processes and jurisdictional authority concerning pipelines on the OCS and in coastal areas are shared by several Federal agencies, including DOI, the Department of Transportation (DOT), the COE, the Federal Energy Regulatory Commission, and USCG. Aside from the enforcement of pipeline regulations, these agencies have the responsibility of overseeing and regulating the following areas: the placement of structures on the OCS and pipelines in areas that affect navigation; the certification of proposed projects involving the transportation or sale of interstate natural gas, including OCS gas; and the right of eminent domain exercised by pipeline companies onshore. In addition, the DOT is responsible for promulgating and enforcing safety regulations for the transportation in interstate commerce of natural gas, liquefied natural gas, and hazardous liquids by pipeline. This includes, for the most part, offshore pipelines on State lands beneath navigable waters and on the OCS that are operated by transmission companies. The regulations are contained in 49 CFR parts 191 through 193 and 195. In a Memorandum of Understanding between the DOT and DOI dated December 10, 1996, each party's respective regulatory responsibilities are outlined. The DOT is responsible for establishing and enforcing design, construction, operation, and maintenance regulations, and for investigating accidents for all OCS transportation pipelines beginning downstream of the point at which operating responsibility transfers from a producing operator to a transporting operator. The DOI's responsibility extends upstream from the transfer point described above.

The BSEE is responsible for regulatory oversight of the design, installation, modification, repair, and decommissioning of OCS producer-operated oil and gas pipelines. The BSEE's operating regulations for pipelines, found at 30 CFR part 250 subpart J, are intended to provide safe and pollution-free transportation of fluids in a manner that does not unduly interfere with other users of the OCS. Pipeline applications may be for on-lease pipelines or right-of-way pipelines that cross other lessees' leases or unleased areas of the OCS. Pipeline permit applications to BSEE include the pipeline location drawing, profile drawing, safety schematic drawing, pipe design data, a shallow hazard survey report, and an archaeological report, if applicable.

The BSEE evaluates the design and proposed route of all OCS pipelines. Proposed pipeline routes are evaluated for potential seafloor or subsea geologic hazards and other natural or manmade seafloor or subsurface features or conditions (including other pipelines) that could have an adverse impact on the pipeline or that could be adversely impacted by the proposed operations. Routes are also evaluated for potential impacts on archaeological resources and biological communities. A NEPA review is conducted in accordance with applicable policies and guidelines. BOEM prepares an EA on all pipeline right-of-ways that go ashore. For Federal consistency, applicants must comply with the regulations as clarified in NTL 2007-G20, "Coastal Zone Management Program Requirements for OCS Right-of-way Pipeline Applications." All Gulf Coast States require consistency review of right-of-way pipeline applications as described in the clarifying NTL. The design of the proposed pipeline is evaluated for an appropriate cathodic protection system to protect the pipeline from the effects of external corrosion on the pipe; an external pipeline coating system to prolong the service life of the pipeline; measures to protect the inside of the pipeline from the detrimental effects, if any, of the fluids being transported; proposed maximum allowable operating pressure and hydrostatic test pressure of the line; inclusion and settings of all safety devices required by regulation; and protection of other pipelines crossing the proposed route. Such an evaluation includes the following: (1) reviewing the calculations used by the applicant in order to determine whether the applicant properly considered such elements as the grade of pipe to be used, the wall thickness of the pipe, de-rating factors (the practice of operating a component well inside its normal operating limits to reduce the rate at which the component deteriorates) related to the submerged and riser portions of the pipeline, the pressure rating of any valves or flanges to be installed in the pipeline, the pressure rating of any other pipeline(s) into which the proposed line might be tied, and the required pressure to which the line must be tested before it is placed in service; (2) protective safety devices such as pressure sensors and remotely operated valves, the physical arrangement of those devices proposed to be installed by the applicant for the purposes of protecting the pipeline from possible overpressure conditions and for detecting and initiating a response to abnormally low-pressure conditions; and (3) the applicant's planned compliance with regulations requiring that pipelines installed in water depths less than 200 ft (61 m) be buried to a depth of at least 3 ft (1 m) (30 CFR § 250.1003). In addition, pipelines crossing fairways require a COE permit and may be required to be buried greater than 3 ft (1 m).

Operators are required to periodically inspect pipeline routes. Monthly overflights are conducted to inspect pipeline routes for leakage. When a pipeline requires a repair, a repair plan notification and repair completion report must be submitted to BSEE for review and acceptance.

Applications for pipeline decommissioning must also be submitted for BSEE review and approval. Decommissioning applications are evaluated to ensure they will render the pipeline inert and/or 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.

In addition, BOEM's Marine Minerals Program and Coastal Zone Management Coordinators, BSEE's Pipelines Section, and the State of Louisiana's Office of Coastal Management and Coastal Protection and Restoration Authority are working closely to ensure that sediment resources on the OCS are made available for restoration projects by requiring the removal of decommissioned pipelines. BOEM is also coordinating with BSEE's Pipeline Section, the State of Louisiana, and applicants with regards to rerouting the proposed pipelines when an application is submitted for emplacement to avoid the sediment resources if at all possible.

A.4 Inspection and Enforcement

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

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

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

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

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

A.5 Pollution Prevention, Oil-Spill Response Plans, and Financial Responsibility

Pollution Prevention

Pollution prevention is addressed through proper design and requirements for safety devices. The BSEE regulations at 30 CFR § 250.401 require that the operator take all necessary precautions to keep its wells under control at all times. The lessee is required to use the best available and safest drilling technology in order to enhance the evaluation of conditions of abnormal pressure and to minimize the potential for the well to flow or kick. Redundancy is required for critical safety devices that will shut off flow from the well if loss of control is encountered.

In addition, BSEE's regulations at 30 CFR part 250 subparts E, F, and H require that the lessee assure the safety and protection of the human, marine, and coastal environments during completion, workover, and production operations. All production facilities, including separators, treaters, compressors, headers, and flowlines are required to be designed, installed, tested, maintained, and used in a manner that provides for efficiency, safety of operations, and protection of the environment. Wells, particularly subsea wells, include a number of sensors that help in detecting pressures and the potential for leaks in the production system. Safety devices are monitored and tested frequently to ensure their operation, should an incident occur. To ensure that safety devices are operating properly, BSEE incorporates the API RP 14C into the operating regulations. The API RP 14C incorporates the knowledge and experience of the oil and gas industry regarding the analysis, design, installation, and testing of the safety devices used to prevent pollution. The API RP 14C presents proven practices for providing these safety devices for offshore production platforms. Proper application of these practices, along with good design, maintenance, and operation of the entire production facility, should provide an operationally safe and pollution-free production platform.

Also, BSEE's regulations at 30 CFR part 250 subpart J require that pipelines and associated valves, flanges, and fittings be designed, installed, operated, and maintained to provide safe and pollution-free transportation of fluids in a manner that does not unduly interfere with other uses on the OCS.

The BSEE regulation at 30 CFR § 250.300(a) requires that lessees not create conditions that will pose an unreasonable risk to public health, life, property, aquatic life, wildlife, recreation, navigation, commercial fishing, or other uses of the ocean during offshore oil and gas operations. The lessee is required to take measures to prevent the unauthorized discharge of pollutants into the offshore waters. Control and removal of pollution is the responsibility and at the expense of the lessee. Immediate corrective action in response to an unauthorized release is required. All hydrocarbon-handling equipment for testing and production, such as separator and treatment tanks, is required to be designed, installed, and operated to prevent pollution. Maintenance and repairs that are necessary to prevent pollution are required to be taken immediately. Drilling and production facilities are required to be inspected daily or at intervals approved or prescribed by BSEE's District Field Operations Supervisor to determine if pollution is occurring.

Operators are required to install curbs, gutters, drip pans, and drains on platform and rig deck areas in a manner necessary to collect all greases, contaminants, and debris not authorized for discharge. The rules also explicitly prohibit the disposal of equipment, cables, chains, containers, or other materials into offshore waters. Portable equipment, spools or reels, drums, pallets, and other loose items must be marked in a durable manner with the owner's name prior to use or transport over offshore waters. Smaller objects must be stored in a marked container when not in use. Operational discharges such as produced water and drilling muds and cuttings are regulated by the USEPA through the National Pollutant Discharge Elimination System permit program for new and existing discharges and sources (40 CFR part 435 subpart A). The BSEE may restrict the rate of drilling fluid discharge or prescribe alternative discharge methods. No petroleum-based substances, including diesel fuel, may be added to the drilling mud system without prior approval of BSEE's District Field Operations Supervisor.

Oil-Spill Response Plans

The BSEE regulations at 30 CFR part 254 require that all owners and operators of oil-handling, storage, or transportation facilities located seaward of the coastline submit an oil-spill response plan (OSRP) for approval. The term "coastline" means the line of ordinary low water along that portion of the coast that is in direct contact with the open sea and the line marking the seaward limit of inland waters. The term "facility" means any structure, group of structures, equipment, or device (other than a vessel), which is used for one or more of the following purposes: exploring for; drilling for; producing; storing; handling; transferring; processing; or transporting oil. A mobile offshore drilling unit is classified as a facility when engaged in drilling or downhole operations.

The regulation at 30 CFR § 254.2 requires that an OSRP must be submitted and approved before an operator can use a facility. The BSEE can grant an exception to this requirement during BSEE's review of an operator's submitted OSRP. In order to be granted this exception during this time period, an owner/operator must certify in writing to BSEE that it is capable of responding to a "worst-case" spill or the substantial threat of such a spill. To continue operations, the facility must be operated in compliance with the approved OSRP or BSEE-accepted "worst-case" spill certification. Owners or operators of offshore pipelines are required to submit an OSRP for any pipeline that carries oil, condensate, or gas with condensate; pipelines carrying essentially dry gas do not require an OSRP. Current OSRPs are required for abandoned facilities until they are physically removed or dismantled.

The OSRP describes how an operator intends to respond to an oil spill. The OSRP may be site-specific or regional (30 CFR § 254.3). The term "regional" means a spill response plan that covers multiple facilities or leases of an owner or operator, including affiliates, which are located in the same BSEE Gulf of Mexico region. The subregional plan concept is similar to the regional concept, which allows leases or facilities to be grouped together for the purposes of (1) calculating response times, (2) determining quantities of response equipment, (3) conducting oil-spill trajectory analyses, (4) determining worst-case discharge scenarios, and (5) identifying areas of special economic and environmental importance that may be impacted and the strategies for their protection. The number and location of the leases and facilities allowed to be covered by a subregional OSRP will be decided by BSEE on a case-by-case basis considering the proximity of the leases or facilities proposed to be covered. The NTL 2012-N06 includes guidance on the preparation and submittal of regional OSRPs.

The Emergency Response Action Plan within the OSRP serves as the core of BSEE-required OSRPs. In accordance with 30 CFR part 254, the Emergency Response Action Plan requires identification of (1) the qualified individual and the spill-response management team, (2) the spill-response operating team, (3) the oil-spill cleanup organizations under contract for response, and (4) the Federal, State, and local regulatory agencies that an owner/operator must notify or that they must consult with to obtain site-specific environmental information when an oil spill occurs. The OSRP is also required to include an inventory of appropriate equipment and materials, their availability, and the time needed for deployment, as well as information pertaining to dispersant use, *in-situ* burning, a worst-case discharge scenario, contractual agreements, training and drills, identification of potentially impacted environmental resources and areas of special economic concern and environmental importance, and strategies for the protection of these resources and areas. The response plan must provide for response to an oil spill from the facility, and the operator must immediately carry out the provisions of the plan whenever an oil spill from the facility occurs. The OSRP must be in compliance with the National Contingency Plan and the Area Contingency Plan(s). The operator is also required to carry out the training, equipment testing, and periodic drills described in the OSRP. All BSEE-approved OSRPs must be reviewed at least every 2 years. In addition, revisions must be submitted to BSEE within 15 days whenever

- a change occurs that appreciably reduces an owner/operator's response capabilities;
- a substantial change occurs in the worst-case discharge scenario or in the type of oil being handled, stored, or transported at the facility;

- there is a change in the name(s) or capabilities of the oil-spill removal organizations cited in the OSRP; or
- there is a change in the applicable Area Contingency Plans.

As a result of the *Deepwater Horizon* explosion and oil spill, although BSEE is not requiring the submission of revised OSRPs at this time, BSEE will provide guidance regarding additional information that operators should submit regarding spill response and surface containment in light of the "worst-case" discharge calculations that are now required by the regulations and as clarified in NTL 2010-N06, "Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS," which became effective on June 18, 2010. This NTL provides clarification of the regulations requiring a lessee or operator to submit supplemental information for new or previously submitted EPs, DPPs, or DOCDs. The required supplemental information includes the following: (1) a description of the blowout scenario as required by 30 CFR §§ 550.213(g) and 550.243(h); (2) a description of their assumptions and calculations used in determining the volume of the worst-case discharge required by 30 CFR § 550.219(a)(2)(iv) (for EPs) or 30 CFR § 550.250(a)(2)(iv) (for DPPs and DOCDs); and (3) a description of the measures proposed that would enhance the ability to prevent a blowout, to reduce the likelihood of a blowout, and to conduct effective and early intervention in the event of a blowout, including the arrangements for drilling relief wells and any other measures proposed. The early intervention methods could actually include the surface and subsea containment resources that BSEE announced in NTL 2010-BSEE-N10, "Statement of Compliance with Applicable Regulations and Evaluation of Information Demonstrating Adequate Spill Response and Well Containment Resources," which states that BSEE will begin reviewing to ensure that the measures are adequate to promptly respond to a blowout or other loss of well control.

Additionally, to address new improved containment systems, NTL 2010-N10 became effective on November 8, 2010. This NTL applies only to operators conducting operations using subsea or surface BOPs on floating facilities. It clarifies the regulations that lessees and operators must submit a certification statement signed by an authorized company official with each application for a well permit, indicating that they will conduct all of their authorized activities in compliance with all applicable regulations, including the Increased Safety Measures Regulations (*Federal Register*, 2010). The NTL also informs lessees that BSEE will be evaluating whether or not each operator has submitted adequate information demonstrating that it has access to and can deploy surface and subsea containment resources that would be adequate to promptly respond to a blowout or other loss of well control. Although the NTL does not provide that operators submit revised OSRPs that include this containment information at this time, operators were notified of BSEE's intention to evaluate the adequacy of each operator to comply in the operator's current OSRP; therefore, there is an incentive for voluntary compliance.

The following requirements are implemented according to BSEE's regulations at 30 CFR parts 250 and 254:

- requires immediate notification for spills >1 bbl—all spills require notification to USCG, and BSEE receives notification from 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 OSRPs for offshore facilities;
- conducts unannounced drills to ensure compliance with OSRPs;
- requires operators to ensure that their spill-response operating and management teams receive appropriate spill-response training;
- conducts inspections of oil-spill response equipment;
- requires industry to show financial responsibility to respond to possible spills; and
- provides research leadership to improve the capabilities for detecting and responding to an oil spill in the marine environment.

BOEM receives and reviews the worst-case discharge and blowout scenarios information submitted for EPs, DPPS, and DOCDs on the OCS. BOEM also has regulatory requirements addressing site-specific OSRPs and spill response information. As required by BOEM at 30 CFR §§ 550.219 and 550.250, operators are required to provide BOEM with an OSRP that is prepared in accordance with 30 CFR part 254 subpart B with their proposed exploration, development, or production plan for the facilities that they will use to conduct their activities; or to alternatively reference their approved regional OSRP by providing the following information:

- a discussion of the approved OSRP;
- the location of the primary oil-spill equipment base and staging area;
- the name of the oil-spill equipment removal organization(s) for both equipment and personnel;
- the calculated volume of the worst-case discharge scenario in accordance with 30 CFR § 254.26(a) and a comparison of the worst-case discharge scenario in the approved regional OSRP with the worst-case discharge calculated for these proposed activities; and
- a description of the worst-case discharge to include the trajectory information, potentially impacted resources, and a detailed discussion of the spill response proposed to the worst-case discharge in accordance with 30 CFR §§ 254(b)-(d).

All OSRPs are reviewed and approved by BSEE, whether submitted with a BOEM-associated plan or directly to BSEE in accordance with 30 CFR part 254. Hence, BOEM relies heavily upon BSEE's expertise to ensure that the OSRP complies with all pertinent laws and regulations, and demonstrates the ability of an operator to respond to a worst-case discharge. The operator is also required to carry out the training, equipment testing, and periodic drills described in the OSRP. Since 1989, BSEE has conducted government initiated unannounced exercises that provide an economically feasible mechanism for agencies to comply with the requirements defined in 30 CFR part 254. In 2014, BSEE carried out seven table-top, government-initiated unannounced exercises and two deployment government-initiated unannounced exercises (USDOI, BSEE, 2014). Equipment deployment exercises most often take place in waterways adjacent to where the equipment is stored, but they may be moved if the exercise requires it. Typical deployment exercises last only a few hours and rarely longer than a day (USDOI, BSEE, official communication, 2015). Site-specific OSRPs are required to be submitted to BOEM with a proposed exploration, development, or production plan, and BOEM's regulations require that an operator must have an approved OSRP prior to BOEM's approval of an operator-submitted exploration, development, or production plan.

Several NTLs and guidance documents have been issued by BOEM and BSEE that clarify additional oil-spill requirements since the occurrence of the *Deepwater Horizon* explosion, oil spill, and response. The following is a summary of that information.

Worst-Case Discharge and Blowout Scenario Information

NTL 2015-BOEM-N01

BOEM issued NTL 2015-BOEM-N01, "Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS for Worst Case Discharge and Blowout Scenarios". This NTL became effective on January 4, 2015, and explains the procedures for the lessee or operator to submit worst-case discharge and blowout scenario information for new or previously submitted EPs, DPPs, or DOCDs. This NTL supersedes NTL 2010-N06, "Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS." The required information to be submitted for new EPs, DPPs, and DOCDs or as a supplement to a previously submitted plan includes the following: (1) a blowout scenario as required by 30 CFR §§ 550.213(g) and 550.243(h); (2) a description of their assumptions and calculations used in determining the volume of the worst-case discharge required by 30 CFR § 550.219(a)(2)(iv) (for EPs) or 30 CFR § 550.250(a)(2)(iv) (for DPPs and DOCDs); and (3) a description of the measures proposed that would enhance the ability to prevent a blowout, to reduce the likelihood of a blowout, and to conduct effective and early intervention in the event of a blowout, including the arrangements for drilling relief wells and any other measures proposed.

BOEM also issued NTL 2015-BOEM-N01, "Frequently Asked Questions Information Sheet for Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS for Worst Case Discharge and Blowout Scenarios". This Frequently Asked Questions information sheet provides guidance intended to assist an operator's compliance with the worst-case discharge and blowout scenario information requirements pursuant to NTL 2015-BOEM-N01 and also provides information regarding BOEM's review of the submitted information.

NTL 2013-BSEE-N02

The BSEE issued NTL 2013-BSEE-N02, "Significant Change to Oil Spill Response Plan Worst Case Discharge Scenario." This NTL clarifies what BSEE considers a significant change in a worst-case discharge scenario, which requires that a revision to an OSRP be submitted. The guidance issued by this NTL states that a significant change in worst-case discharge may occur when calculating a new worst-case discharge based upon the following:

- the addition of a new facility installation or well;
- a modification to an existing facility; or
- a change in any assumptions and calculations used to determine the prior estimated worst-case discharge.

The NTL 2013-BSEE-N02 identifies the process an owner or operator of a facility should utilize to determine whether the newly calculated worst-case discharge represents a significant change. The BSEE considers a change in worst-case discharge as significant and thus requiring revision when the process identifies the need for additional onshore or offshore response equipment beyond what is included in an approved OSRP. Although information to make this determination is submitted to BOEM and forwarded to BSEE with a proposed exploration, development, or production plan, pursuant to NTL 2013-BSEE-N02, the 15-day timeframe for notification of a significant change will be enforced by BSEE as beginning no later than the date that the operator submitted an Application for Permit to Drill to BSEE.

Typically, for OSRP revisions, once BSEE approves an OSRP, it must be reviewed at least every 2 years, and modifications must be submitted in accordance with 30 CFR § 254.30(a). If no modifications are deemed necessary, the owner or operator must inform BSEE in writing that there are no changes. A separate revision to an OSRP must be submitted to BSEE within 15 days when the following conditions are met:

- there is a change that significantly reduces operator response capabilities;
- a significant change occurs in the worst-case discharge or in the type of oil being handled, stored, or transported at a facility;
- there is a change in the names or capabilities of the oil-spill removal organizations cited in the plan; or
- there is a significant change to the Area Contingency Plan.

NTL 2012-BSEE-N06

The BSEE also issued NTL 2012-BSEE-N06, "Guidance to Owners and Offshore Facilities Seaward of the Coast Line Concerning Regional Oil Spill Response Plans." This NTL, which was effective on August 10, 2012, provides clarification, guidance, and information concerning the preparation and submittal of a regional OSRP for owners and operators of oil handling, storage, or transportation facilities, including pipelines located seaward of the coastline. A regional OSRP is defined as a spill response plan covering multiple facilities or leases of an owner, or operator, or their affiliates, which are located in the same BSEE region. Site-specific OSRPs submitted with BOEM exploration, development, or production plans can either be prepared using the 30 CFR part 254 regulations or the guidance outlined in NTL 2012-BSEE-N06.

Some of the clarifications and encouraged practices identified in NTL 2012-BSEE-N06 are based upon lessons learned from the *Deepwater Horizon* oil-spill response. This NTL indicates that BSEE's review of OSRPs would also be based, in part, upon information obtained during the *Deepwater Horizon* oil-spill response. For example, during the *Deepwater Horizon* oil-spill response, it was discovered that the total estimated de-rated recovery capacity for all equipment listed in the OSRP overestimated the amount of oil that could be removed from the water. The NTL 2012-BSEE-N06 therefore states that the OSRP should be developed considering (1) a fully developed response strategy that includes the identification of the available dedicated recovery equipment as well as the actual operating characteristics of the systems associated with each skimmer and (2) the use of new technology and response systems that will increase the effectiveness of mechanical recovery tactics.

The NTL 2012-BSEE-N06 is designed to encourage owners and operators of offshore facilities to include innovative offshore oil-spill response techniques, particularly for a continuous high-rate spill. This NTL includes requirements for the submittal of information regarding subsea containment equipment and subsea dispersant application among other provisions. This NTL also encourages the inclusion of options that would improve spill-response capabilities such as:

- using remote-sensing techniques as a tool for safe night operations to increase oil-spill detection and to improve thickness determinations for ascertaining the effectiveness of response strategies;
- increasing spill-response operational time by reducing transit times to disposal locations and decontamination equipment;
- identifying sources for supplies and materials, such as fire boom and dispersants, that can support a response to an uncontrolled spill lasting longer than 30 days or for the duration of the spill response; and
- the use and specification of primary and secondary communications technology and software for coordinating and directing spill-response operations systems and/or providing a common operating picture to all spill management and response personnel, including the Federal On-Scene Coordinator and participating Federal and State government officials.

NTL 2012-BSEE-N07

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

NTL 2010-N10

The Bureau of Ocean Energy Management, Regulation and Enforcement issued NTL 2010-N10, “Statement of Compliance with Applicable Regulations and Evaluation of Information Demonstrating Adequate Spill Response and Well Containment Resources,” which became effective on November 8, 2010. This NTL applies only to operators conducting operations using subsea or surface BOPs on floating facilities. It explains that lessees and operators submit a statement signed by an authorized company official with each application for a well permit indicating that they will conduct all of their authorized activities in compliance with all applicable regulations, including the Increased Safety Measures Regulations (*Federal Register*, 2010). The NTL also informs lessees that BOEM will be evaluating whether or not each operator has submitted adequate information demonstrating that it has access to and can deploy surface and subsea containment resources that would be adequate to promptly respond to a blowout or other loss of well control. The NTL notifies the operator that BOEM intends to evaluate the adequacy of each operator to comply in the operator’s current OSRP; therefore, there is an incentive for voluntary compliance. The NTL lists the type of information that BOEM would review as follows:

- subsea containment and capture equipment, including containment domes and capping stacks;
- subsea utility equipment, including hydraulic power, hydrate control, and dispersant injection equipment;
- riser systems;
- remotely operated vehicles;
- capture vessels;
- support vessels; and
- storage facilities.

Spill Response Initiatives

For more than 25 years, BSEE and its predecessors have maintained a comprehensive long-term research program to improve oil-spill response knowledge and technologies. The major focus of the program is to improve the methods and technologies used for oil-spill detection, containment, treatment, recovery, and cleanup. The BSEE Oil Spill Response Research program is a cooperative effort bringing together funding and expertise from research partners in State and Federal government agencies, industry, academia, and the international community. The projects funded cover numerous spill response-related issues such as chemical treating agents; *in-situ* burning of oil; research conducted at BSEE's Oil Spill Response Test Facility (Ohmsett) located in Leonardo, New Jersey; behavior of oil; decisionmaking support tools; mechanical containment; and remote sensing.

A few of BSEE's research contracts that highlight the varied types of research funded include the following:

- "Leveraging Offshore Hydrocarbon Risk Assessment Models and Datasets to Support the Evaluation and Ranking of Worst Case Discharge Scenarios" (Project Number 1046) – The objective of this project is to develop a set of methodologies and algorithms, and a computer model for the comparison and ranking of different spill scenarios to determine which one has the greater potential for damage to the environment or result in other significant impacts and should be classified as the worst-case discharge.
- "Scientifically Based Field Tools for Predicting Dispersant Effectiveness and Usage Rates" (Project Number 1043) – This project will bridge the gap between laboratory methodology and field analysis by incorporating the modified 1-liter Baffled Flask Test and fluorescence probe for determining dispersant effectiveness in the field.
- "Technology Readiness Level (TRL) Definitions for Oil Spill Response Technologies and Equipment" (Project Number 1042) – The objective of this study is to establish a uniform and objective means to determine the level of maturity of a new technology and when it is ready for use in the field.
- "HC-Sentinel: An AUV Glider for High Endurance Subsea Hydrocarbon Detection" (Project Number 1041) – The objective of this study is to develop and test a next generation *in-situ* mass spectrometer payload that operates on an autonomous underwater vehicle glider for real-time subsea hydrocarbon detection and classification and that can be designed to operate for long-term subsea inspection, monitoring, and incident response.

More information on these and the other awarded and completed research projects can be found on BSEE's website at http://www.bsee.gov/Technology-and-Research/Research/.

Incident Reporting

The Minerals Management Service (MMS) (BOEM's predecessor) revised operator incident reporting requirements in a final rule effective July 17, 2006 (*Federal Register*, 2006). The incident reporting rule defines what incidents must be reported, includes incidents that have the potential to be serious, and requires the reporting of standard information for both oral and written reports. As part of the incident reporting rule, BOEM's regulations at 30 CFR § 250.188(a)(6) require an operator to report all collisions that result in property or equipment damage greater than $25,000. "Collision" is defined as the act of a moving vessel (including an aircraft) striking another vessel or striking a stationary vessel or object (e.g., a boat striking a drilling rig or platform).

Financial Responsibility

The responsible party for covered offshore facilities must demonstrate oil-spill financial responsibility, as required by 30 CFR part 553. These regulations implement the oil-spill financial responsibility requirements of Title I of the Oil Pollution Act of 1990, as amended. Penalties for noncompliance with these requirements are covered at 30 CFR § 553.51 and in NTL 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities." A covered offshore facility, as defined in 30 CFR § 553.3, is any structure and all of its components (including wells completed at the structure and the associated pipelines), equipment, pipeline, or device (other than a vessel or other than a pipeline or deepwater port licensed under the Deepwater Port Act of 1974) used for exploring, drilling, or producing oil, or for transporting oil from such facilities. The BSEE ensures that each responsible party has sufficient funds for removal costs and damages resulting from the accidental release of liquid hydrocarbons into the environment for which the responsible party is liable.

A.6 AIR EMISSIONS

The OCSLA (43 U.S.C. § 1334(a)(8)) requires the Secretary of the Interior to promulgate and administer regulations that comply with the National Ambient Air Quality Standards, pursuant to the Clean Air Act (42 U.S.C. §§ 7401 *et seq.*), to the extent that authorized activities significantly affect the air quality of any State. Under provisions of the Clean Air Act Amendments of 1990, the USEPA Administrator has jurisdiction and, in consultation with the Secretary of the Interior and the Commandant of the Coast Guard, established the requirements to control air pollution in OCS areas of the Pacific, Atlantic, Arctic, and eastward of 87.5° W. longitude in the Gulf of Mexico. Air quality in the OCS area westward of 87.5° W. longitude in the Gulf of Mexico is under BOEM's jurisdiction.

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

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

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

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

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

A.7 Flaring/Venting

Flaring is the controlled burning of natural gas, and venting is releasing gas directly into the atmosphere without burning (refer to **Chapter 3.1.8.4**). The BSEE regulates flaring/venting to minimize the loss of revenue producing natural gas resources. The BSEE regulations at 30 CFR part 250 allow, without prior BSEE approval, flaring or venting of natural gas on a limited basis under certain specified conditions. Regulations permit more extensive flaring/venting with prior approval from BSEE. Records must always be prepared by the operator for all flaring/venting, and justification must be provided for flaring/venting not expressly authorized by BSEE's regulations.

A.8 Hydrogen Sulfide Contingency Plans

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

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

A.9 ARCHAEOLOGICAL RESOURCES REGULATION

Bottom-disturbing operations such as well placement, anchoring, and pipelaying activities can lead to damage to any resources that reside on or embedded within the seabed, including archaeological resources such as historic shipwrecks. The archaeological resources regulations at 30 CFR § 250.194 and 30 CFR § 550.194 grant authority to BOEM's and BSEE's Regional Directors to require that an archaeological survey report be submitted with the EP, DOCD, or DPP where deemed necessary. The technical requirements of the high-resolution geophysical survey, archaeological analysis, and report are detailed in NTL 2005-G07, "Archaeological Resource Surveys and Reports." If data from the operator's high-resolution geophysical survey and archaeological report suggest that an archaeological resource may be present, the lessee must either locate the site of any operation so as not to adversely affect the area of the seafloor identified for archaeological avoidance, demonstrate that the identified geophysical target is not an archaeological resource through remotely operated vehicle or diver investigation, or demonstrate that potential archaeological resources will not be adversely affected by operations. If the lessee discovers any archaeological resource while conducting approved operations, operations must be immediately stopped and the discovery reported to BOEM's Regional Supervisor, Office of Environment, within 48 hours of its discovery.

High-resolution surveys, where required, provide an effective tool that analysts use to identify and help protect archaeological resources. As part of the environmental reviews conducted for postlease activities, all available information will be evaluated regarding the potential presence of archaeological resources within a proposed action area to determine if mitigation is warranted.

A.10 COASTAL ZONE MANAGEMENT CONSISTENCY REVIEW AND APPEALS FOR POSTLEASE ACTIVITIES

The Coastal Zone Management Act (CZMA) places requirements on any applicant for any federally licensed or permitted activities on the OCS (i.e., OCS plans, right-of-way pipelines, geological and geophysical surveys, and decommissioning) affecting any coastal use or resource, in or outside of a State's coastal zone. The applicant must provide a consistency certification and necessary data and information for the State to determine that the proposed activities comply with the enforceable policies of the State's CMP, approved by NOAA, and that such activities will be fully consistent with those enforceable policies (16 U.S.C. § 1456(c)(3)(A) and 15 CFR § 930.76).

Except as provided in 15 CFR § 930.60(a), State agency consistency review begins when the State receives the OCS plan or application, consistency certification, and necessary data and information pursuant to 15 CFR §§ 930.76(a) and (b). Only missing information can be used to delay the commencement of State agency review, and a request for information and data that are not required by 15 CFR § 930.76 will not extend the date of commencement of review (15 CFR § 930.58). The information requirements for CZM purposes are found at 30 CFR §§ 550.226 and 550.260 and are discussed in NTL 2012-BSEE-N06, “Guidance to Owners and Operators of Offshore Facilities Seaward of the Coast Line Concerning Regional Oil Spill Response Plans” ; NTL 2008-G04, “Information Requirements for Exploration Plans and Development Operations Coordination Documents”; NTL 2009-G27, “Submitting Exploration Plans and Development Operations Coordination Documents”; NTL 2015-BOEM-N01, “Information Requirements for Exploration Plans, Development and Production Plans, and Development Operations Coordination Documents on the OCS for Worst Case Discharge and Blowout Scenarios”; NTL 2010-N10, “Statement of Compliance with Applicable Regulations and Evaluation of Information Demonstrating Adequate Spill Response and Well Containment Resources”; and NTL 2007-G20, “Coastal Zone Management Program Requirements for OCS Right-of-Way Pipeline Applications.”

All of the Gulf Coast States have federally approved CMP’s. Requirements for the CZM consistency information for Texas, Louisiana, Mississippi, Alabama, and Florida are given in NTL’s 2012-BSEE-N06, 2008-G04, 2009-G27, 2015-BOEM-N01, 2010-N10, and 2007-G20. In accordance with the requirements of 15 CFR § 930.76, BOEM’s Gulf of Mexico OCS Region sends copies of an OCS plan, including the consistency certification and other necessary data and information, to the designated State CMP agency by receipted mail or other approved communication. In accordance with the requirements of 15 CFR § 930.60, the applicants are responsible for sending the State CMP agency a copy of the applicant, consistency certification, and necessary data and information at the same time as when the applicant sends it to BOEM or BSEE. If no State-agency objection is submitted by the end of the consistency review period, BOEM shall presume consistency concurrence by the CZMA State (15 CFR § 930.78(b)). BOEM can require modification of a plan or application.

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

A.11 Best Available and Safest Technologies

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

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

Production Facilities

The BSEE regulations governing oil and gas production safety systems can be found in 30 CFR 250 Subpart H. Production safety equipment used on the OCS must be designed, installed, used, maintained, and tested in a manner to assure the safety and protection of the human, marine, and coastal environments. All tubing installations open to hydrocarbon-bearing zones below the surface must be equipped with safety devices that will shut off the flow from the well in the event of an emergency, unless the well is incapable of flowing. Surface- and subsurface-controlled safety valves and locks must conform to the requirements of 30 CFR § 250.801. All surface production facilities, including separator and treatment tanks, compressors, headers, and flowlines must be designed, installed, and maintained in a manner that provides for efficiency, safety of operations, and protection of the environment. Production facilities also have stringent requirements concerning electrical systems, flowlines, engines, and firefighting systems. The safety-system devices are tested by the lessee at specified intervals and must be in accordance with API RP 14 C Appendix D and other measures.

A.12 Personnel Training and Education

An important factor in ensuring that offshore oil and gas operations are carried out in a manner that emphasizes operational safety and minimizes the risk of environmental damage is the proper training of personnel. Under 30 CFR part 250 subpart O, BSEE has outlined well control and production safety training program requirements for lessees operating on the OCS. The goal of the regulation (30 CFR § 250.1501) is safe and responsible OCS operations. Lessees must ensure that their employees and contract personnel engaged in well control or production safety operations understand and can properly perform their duties. To accomplish this, the lessee must establish and implement a training program so that all of its employees are trained to competently perform their assigned well control and production safety duties. The lessee must also verify that its employees understand and can perform the assigned duties.

The mandatory Drilling Well-Control Training Program was instituted by this Agency in 1979. In 1983, the mandatory Safety Device Training Program was established to ensure that personnel involved in installing, inspecting, testing, and maintaining safety devices are qualified. As a preventive measure, all offshore personnel must be trained to operate oil-spill cleanup equipment, or the lessee must retain a trained contractor(s) to operate the equipment for them. In addition, BSEE offers numerous technical seminars to ensure that personnel are capable of performing their duties and are incorporating the most up-to-date safety procedures and technology in the petroleum industry.

On February 5, 1997, MMS (BOEM's predecessor) published a final rule in the *Federal Register* (1997) concerning the training of the lessee and contractor employees engaged in drilling, well completion, well workover, well serving, or production safety system operations in the OCS. The final rule streamlined the previous regulations by 80 percent, provided the flexibility to use alternative training methods, and simplified the training options at 30 CFR part 250 subpart O. Although the rule did away with many of the onerous requirements in subpart O and served as intermediate change to the system, it did not sufficiently address development of a performance-based training system.

On August 14, 2000, MMS (BOEM's predecessor) published in the *Federal Register* (2000) final regulations revising 30 CFR part 250, subpart O, "Well Control and Production Safety Training." The MMS distributed the published final rulemaking to lessees, operators, and training schools. These new performance-based regulations took effect on October 13, 2000. To allow sufficient time for lessees to implement their training programs, the rule provided a 2-year transition period from October 13, 2000, until October 15, 2002. After October 15, 2002, all lessees were required to be in compliance with this rule.

Goal of Performance Training Rule: Safe and responsible OCS operations. Lessees must ensure their employees, including contractors, are trained to competently perform their assigned well control and production safety duties. This rule should allow companies to focus their resources on important areas in their program rather than on sending all of their personnel to the same school program on a routine basis.

Key Elements of Performance Based Training: Under this rule, schools will be free to operate but they will not receive agency approval and they will no longer be able to issue subpart O certifications. By shifting the responsibility of developing training programs to industry, lessees will have to decide upon the type of training for their employees. The BSEE will hold the lessees responsible for the success or failure of these and other training related decisions.

Lessees Training Plan: The lessees' training plan is the core item of BSEE's performance-based program. The plan, which does not have to be approved by BSEE, lays out the company's training philosophy. It must specify the type, method(s), length, frequency, and content of their program. Training requirements under this rule are limited to only well control and production operations.

Performance Indicators: The BSEE will periodically assess lessee and contractor training programs to see how well their employees are trained. To assess programs, BSEE may use one or more of the following evaluation methods: (1) audits; (2) written tests; (3) hands-on tests; and (4) employee interviews.

A.13 Structure Removal and Site Clearance

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

There are, however, possible exemptions to the 1-year deadline, including the exemptions stated in Section 388 of the Environmental Policy Act. Section 388 clarifies the Secretary's authority to allow an offshore oil and gas structure, previously permitted under the OCSLA, to remain in place after OCS oil- and gas-related activities have ceased in order to allow the use of the structure for other energy- and marine-related activities. This authority provides opportunities to extend the life of facilities for non-OCS oil- and gas-related purposes, such as research, renewable energy production, aquaculture, etc., before being removed.

This Agency previously addressed removal operations and the potential impacts of severing methodologies (nonexplosive/explosive tools) in a Programmatic EA prepared in 1987 (USDOI, MMS, 1987). The scope of the decommissioning activities analyzed in the Programmatic EA was limited to traditional, bottom-founded structures (i.e., well protectors, caissons, and jacketed platforms) and did not address well abandonment operations; activities similar in nature, but monitored and reported according to a separate section of the OCSLA regulations. In addition, since the majority of removal operations took place in water depths >200 m (656 ft), only the shelf areas of the CPA and WPA were addressed by the proposed actions.

In response to advancements in decommissioning methodologies and regulatory requirements since the 1987 Programmatic EA was prepared, as well as the continued movement into more deepwater prospects (>200 m; 656 ft), this Agency prepared *Structure-Removal Operations on the Gulf of Mexico Outer Continental Shelf: Programmatic Environmental Assessment* (USDOI, MMS, 2005). This Programmatic EA serves three primary needs:

- aids in the permitting, management, and planning of future structure-removal operations;
- ensures that adequate environmental reviews are conducted on all decommissioning proposals that would help support human health and safety while simultaneously protecting the sensitive marine environment; and
- serves as a reference document to implement the "tiering" objective detailed in NEPA's implementing regulations (40 CFR § 1502.20) (future, site-specific EAs may reference appropriate chapters of this Programmatic EA to reduce reiteration of issues and impacts, allowing analyses to focus on specific issues and impacts related to the removal activity).

In 1988, this Agency requested a "generic" consultation from NMFS pursuant to Section 7 of the Endangered Species Act concerning potential impacts on endangered and threatened species associated with explosive-severance activities conducted during structure-removal operations. Much like the Programmatic EA, the consultation's "generic" Biological Opinion was limited to the best scientific information available and concentrated primarily on the majority of structure removals (water depths <200 m [656 ft]). The Incidental Take Statement was therefore limited to the five species of sea turtles found on the shallow shelf. Reporting guidelines and specific mitigating measures are outlined in the Incidental Take Statement and include (1) the use of a qualified NMFS observer, (2) aerial surveys, (3) detonation delay radii, (4) nighttime blast restrictions, (5) charge staggering and grouping, and (6) possible diver survey requirements.

Emphasizing a continued need for an incentive to keep explosive weights low, this Agency formally requested that NMFS amend the 1988 Biological Opinion to establish a minimum charge size of 5 lb. The NMFS' Southeast Regional Office subsequently addressed explosive charges ≤5 lb in a separate, informal Biological Opinion. The October 2003 "de-minimus" Biological Opinion waives several mitigating measures of the "generic" 1988 Biological Opinion (i.e., aerial observations, 48-hour pre-detonation observer coverage, onsite NOAA personnel, etc.), reduces the potential impact zone from 3,000 ft to 700 ft (914 m to 213 m) and gives the operators/severing contractors the opportunity to conduct their own observation work.

In 1989, the American Petroleum Institute petitioned NMFS under Subpart A of the Marine Mammal Protection Act regulations for the incidental take of spotted and bottlenose dolphins during structure-removal operations (i.e., for either explosive- or nonexplosive-severance activities). The Incidental Take Authorization regulations were promulgated by NMFS in October 1995 (*Federal Register*, 1995) and on April 10, 1996, the regulations were moved to subpart M (50 CFR §§ 216.141 *et seq*.). Effective for 5 years, the regulations detailed conditions, reporting requirements, and mitigating measures similar to those listed in the 1988 ESA Consultation requirements for sea turtles. After the regulations expired in November 2000, NMFS and this Agency advised operators to continue following the guidelines and mitigating measures of the lapsed subpart pending a new petition and subsequent regulations. At industry's prompting, NMFS released interim regulations in August 2002, which expired on February 2, 2004. Operators have continued to follow the interim conditions until NMFS promulgates new regulations.

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 according to 30 CFR §§ 250.1740-1743. The NTL 98-26, "Minimum Interim Requirements for Site Clearance (and Verification) of Abandoned Oil and Gas Structures in the Gulf of Mexico," provides the requirements for site clearance. The lessee must develop, and submit to BOEM for approval, a procedural plan for the site clearance verification procedures. For platform and caisson locations in water depths of <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.

A NEPA analysis, in the form of an EA or EIS, is completed for all structure removals that propose explosive severance methods and/or site clearance trawling. The Marine Protected Species NTLs' discussion below describes regulations, reporting guidelines, and specific mitigating measures developed through consultation, pursuant to section 7 of the Endangered Species Act and the Marine Mammal Protection Act, concerning potential impacts on endangered and threatened species associated with explosive severance activities conducted during the structure-removal operations. All of the current terms and conditions of structure and well-removal activities are outlined in NTL 2010-G05, "Decommissioning Guidance for Wells and Platforms," which became effective on October 15, 2010.

A.14 Marine Protected Species NTLs

Four NTLs advise operators of measures designed to reduce impacts to Marine Protected Species: NTL 2012-JOINT-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program"; NTL 2012-BSEE-G01, "Marine Trash and Debris Awareness and Elimination"; NTL 2016-BOEM-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"; and NTL 2010-G05, "Decommissioning Guidance for Wells and Platforms." The provisions outlined in these NTLs apply to all existing and future oil and gas operations in the Gulf of Mexico OCS.

The NTL 2012-JOINT-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program," provides guidance to protect marine mammals and sea turtles during seismic operations. This NTL clarifies how operators should implement seismic survey mitigating measures (including ramp-up procedures), the use of a minimum sound source, airgun testing, and protected species observation and reporting.

The NTL 2012-BSEE-G01, "Marine Trash and Debris Awareness and Elimination," provides information on the marine trash and debris awareness training video and slide show, and both postal and email addresses for submitting annual training reports.

The NTL 2016-BOEM-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting," explains how operators must implement measures to minimize the risk of vessel strikes to protected species and report observations of injured or dead protected species.

The NTL 2010-BSEE-G05, "Decommissioning Guidance for Wells and Platforms," provides clarification and interpretation of regulations regarding decommissioning, as well as guidance to operators proposing to use explosives to perform well/casing severance. These guidelines specify and reference mitigation, monitoring, and reporting requirements that allow explosive charges up to 500 lb, internal and external placement, and both above-mudline and below-mudline detonations.

A.15 RIGS-TO-REEFS

The BSEE is responsible for permitting the placement and eventual removal of temporary oil and gas facilities on the Federal OCS. When an OCS lease expires and/or development and production operations cease, companies are obligated to decommission and remove their facilities (30 CFR § 250.1725(a)) and clear the seabed of all obstructions (30 CFR § 250.1740). The BSEE's Rigs-to-Reefs Policy provides a means by which lessees may request a waiver to the removal requirement. Under 30 CFR § 250.1730, BSEE may grant a departure from the 30 CFR § 250.1725(a) requirement to remove a platform. Although BSEE supports and encourages the reuse of obsolete oil and gas structures as artificial reefs and is a cooperating agency in implementing the National Artificial Reef Plan, specific requirements must be met for a departure to be granted. The BSEE may allow a departure from removal requirements (30 CFR § 250.1725(a)) and applicable lease obligations provided that

- the structure must become part of a State artificial reef program that complies with the criteria in the National Artificial Reef Plan (30 CFR § 250.1730(a));

- the responsible State agency requires a permit from the COE and must accept title and liability for the reefed structure once removal/reefing operations are concluded (30 CFR § 250.1730(a)); and
- the lessee/operator must satisfy any USCG navigational requirements for the reefed structure (30 CFR § 250.1730(b)).

All five Gulf Coast States have active artificial reef programs that develop and manage artificial reefs on the Federal OCS; however, Louisiana and Texas are the primary participants since the majority of platforms are installed offshore these two states. Since the inception of Rigs-to Reef, over 470 decommissioned platforms have been donated and deployed as artificial reefs in the Gulf of Mexico.

A.16 References

Federal Register. 1995. Incidental take of marine mammals; bottlenose dolphins and spotted dolphins. 60 FR 233, pp. 62243-62244. December 5, 1995.

Federal Register. 1997. Training of lessee and contractor employees engaged in oil and gas and sulphur operations in the outer continental shelf (OCS). Final rule. 62 FR 24, pp. 5320-5329. February 5, 1997.

Federal Register. 2000. Oil and gas and sulphur operations in the outer continental shelf—Subpart O—Well control and production safety training. Final rule. 65 FR 157, pp. 49485-49491. August 14, 2000.

Federal Register. 2005. Oil and gas and sulphur operations in the outer continental shelf-Plans and information. Final Rule. 70 FR 167, pp. 51478-51519. August 30, 2005.

Federal Register. 2006. Oil and gas and sulphur operations in the outer continental shelf—Incident reporting requirements. Final rule. 71 FR 73, pp. 19640-19646. April 17, 2006.

Federal Register. 2010. Oil and gas and sulphur operations in the outer continental shelf—Increased safety measures for energy development on the outer continental shelf. Interim final rule. 75 FR 198, pp. 63346-63377. October 14, 2010.

Regg, J.B., S. Atkins, B. Hauser, J. Hennessey, B. Kruse, J. Lowenhaupt, B. Smith, and A. White. 2000. Deepwater development: A reference document for the deepwater environmental assessment, Gulf of Mexico OCS (1998 through 2007). U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Report MMS 2000-015. 94 pp.

U.S. Dept. of the Interior. 2010. Increased safety measures for energy development on the outer continental shelf, May 27, 2010. U.S. Dept. of the Interior, Washington, DC. 44 pp. Internet website: http://loe.org/images/content/100528/Increased-Safety-Measures-Report-2.pdf.

U.S. Dept. of the Interior. Bureau of Safety and Environmental Enforcement. 2014. Annual report 2014. Internet website: http://www.bsee.gov/uploadedFiles/BSEE/BSEE_Newsroom/

Publications_Library/Annual_Report/BSEE%202014%20Annual%20Report.pdf. Accessed December 2, 2015.

U.S. Dept. of the Interior. Bureau of Safety and Environmental Enforcement. 2015. Official communication. Memorandum regarding BSEE's initiated oil spill response equipment deployments – coverage under the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA). November 18, 2015.

U.S. Dept. of the Interior. Minerals Management Service. 1987. Programmatic environmental assessment: Structure removal activities, Central and Western Gulf of Mexico Planning Areas. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS EIS/EA MMS 87-0002. 84 pp.

U.S. Dept. of the Interior. Minerals Management Service. 2000. Gulf of Mexico deepwater operations and activities: Environmental assessment. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS EIS/EA MMS 2000-001. 264 pp. Internet website: http://www.boem.gov/BOEM-Newsroom/Library/Publications/2000/2000-001.aspx.

U.S. Dept. of the Interior. Minerals Management Service. 2004. Geological and geophysical exploration for mineral resources on the Gulf of Mexico outer continental shelf—final programmatic environmental assessment. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS EIS/EA MMS 2004-054. 466 pp.

U.S. Dept. of the Interior. Minerals Management Service. 2005. Structure-removal operations on the outer continental shelf of the Gulf of Mexico—programmatic environmental assessment. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS EIS/EA MMS 2005-013. 333 pp.

APPENDIX B

COMMONLY APPLIED MITIGATING MEASURES

B COMMONLY APPLIED MITIGATING MEASURES

Postlease mitigating measures have been implemented for over 40 years in the Gulf of Mexico region, as they relate to OCS plans and pipeline applications. These mitigating measures have been amended over time to address changes in regulations, new technology, and new methods of operating. Many of these mitigating measures have been adopted and incorporated into regulations and/or guidelines governing OCS oil and gas exploration, development, and production activities. All plans for OCS oil- and gas-related activities (e.g., exploration and development plans, pipeline applications, geological and geophysical activities, and structure-removal applications) go through rigorous BOEM review and approval to ensure compliance with established laws and regulations. Existing mitigating measures must be incorporated and documented in plans submitted to BOEM. Operational compliance of the mitigating measures is enforced through the Bureau of Safety and Environmental Enforcement's (BSEE's) onsite inspection program.

Mitigating measures are an integral part of BOEM's program to ensure that postlease operations are always conducted in an environmentally sound manner (with an emphasis on minimizing any adverse impact of routine operations on the environment). For example, post-activity surveys are carried out to ensure that a site has been cleared of potential snags to commercial fishing gear, and pre-activity surveys seek to avoid archaeological sites and biologically sensitive areas such as pinnacles, topographic features, and chemosynthetic communities.

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

Site-specific mitigating measures are also applied by BOEM during plan and permit reviews. BOEM realized that many of these site-specific mitigations were recurring and developed a list of "standard" or commonly applied mitigations. There are currently over 120 standard mitigations. The wording of a standard mitigation is developed by BOEM in advance and may be applied whenever conditions warrant. Standard mitigation text is revised as often as is necessary (e.g., to reflect changes in regulatory citations, agency/personnel contact numbers, and internal policy). Site-specific mitigation "categories" include the following: air quality; archaeological resources; artificial reef material; chemosynthetic communities; Flower Garden Banks; topographic features; hard bottoms/pinnacles; military warning areas and Eglin Water Test Areas (EWTAs); hydrogen sulfide (H_2S); drilling hazards; remotely operated vehicle surveys; geophysical survey reviews; and general safety concerns. Site-specific mitigation "types" include the following: advisories; conditions of approval; hazard survey reviews; inspection requirements; notifications; post-approval submittals; and safety precautions. In addition to standard mitigations, BOEM may also apply nonrecurring mitigating measures that are developed on a case-by-case basis.

Following a lease sale, an applicant seeks approvals to develop their lease by preparing and submitting OCS plans. The OCS plans are reviewed by BOEM and, depending on what is proposed to take place in a specific place, BOEM may assign conditions of approval (COA). The COAs become part of the approved postlease authorization and include environmental protections, requirements that maintain conformance with law, the requirements of other agencies having jurisdiction, or safety precautions.

Some of BOEM's conditions of approval include the following:

- other approvals prerequisite to BOEM's approval (e.g., the Coastal Zone Management Act);
- safety precautions (e.g., H_2S present);
- post-approval submittals (e.g., surveys and interpretive reports);
- inspection requirements (e.g., pipeline pressure testing);
- pre-deployment notifications (e.g., U.S. Department of Defense use restrictions and Military Warning Areas); and
- reduce or avoid environmental impacts on resources identified in NEPA or other laws (e.g., the National Historic Preservation Act).

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

Table B-1 provides a list and description of standard postlease mitigating measures that may be required by BOEM or BSEE as a result of plan and permit review processes for the Gulf of Mexico OCS Region.

Table B-1. Commonly Applied or “Standard” Mitigating Measures.

Mitigation Number	Mitigating Measure Title	Description of Mitigation
0.0	Non-Recurring Mitigation	A non-recurring mitigation is a mitigating measure that is used for a unique, special, one-time-only mitigation that is added to certain plans.
Boat Traffic Mitigations		
1.04	Seismic Vessels (protected species requirements)	The applicant will comply with Notice to Lessees and Operators (NTL) 2012-JOINT-G02, “Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program.” Additionally, the applicant will comply with the guidance under this NTL when operating in all water depths (not just in water depths >200 m [656 ft] or in the Eastern Planning Area), and the NTL’s “Shut-Down Conditions” will be applied towards manatees.
1.05	Seismic Vessels (vessel-strike avoidance/reporting)	The applicant will follow the guidance provided under NTL 2016-BOEM-G01, “Vessel Strike Avoidance and Injured/Dead Protected Species Reporting.” This provides guidance on how a seismic applicant should implement monitoring programs to minimize the risk of vessel strikes to protected species and report observations of injured or dead protected species. In lieu of a formal observer program, NTL 2016-BOEM-G01 provides specific guidelines that should be followed to identify and avoid injury to marine mammals and sea turtles.
1.06	Progressive-Transport/“Hopping” (structure removals)	In accordance with the Outer Continental Shelf Lands Act (OCSLA) requirements (30 CFR § 250.1727(g)), if at any point in the decommissioning schedule progressive-transport/“hopping” activities are required to section the jacket assembly or support material barge loading, a prior written request must be submitted and approval must be obtained from the Bureau of Safety and Environmental Enforcement’s (BSEE’s) Regional Supervisor, Field Operations. The applicant’s request to use progressive-transport must include a detailed procedural narrative and separate location plat for each “set-down” site, showing pipelines, anchor patterns for the derrick barge, and any known archaeological and/or potentially sensitive biological features. The diagram/map of the route to be taken from the initial structure location along the transport path to each site must also be submitted with the request. If the block(s) that the applicant intends to use as “set-down” sites have not been surveyed as per NTL 2009-G39, “Biologically-Sensitive Underwater Features and Areas,” and NTL 2005-G07, “Archaeological Resource Surveys and Reports,” the applicant may be required to conduct the necessary surveys/reporting prior to mobilizing on site and conducting any seafloor-disturbing activities.

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
1.07	Seismic Vessels (notification requirements)	In accordance with 30 CFR § 550.208(b)(2), the applicant is hereby required to notify other users of the Outer Continental Shelf (OCS) before conducting the proposed ancillary activities. Prior to commencing the survey(s), the applicant must inform the operators of all leases affected by the proposed activities of when and where the applicant intends to conduct the vessel operations to ensure that proper navigation and safety protocol are observed.
Air Quality Mitigations		
2.05	Fuel Usage or Run Time Documentation	The projected nitrogen oxides (NO_x) emissions amounts in the plan were calculated using historic (insert fuel consumption rates, run times). Maintain monthly records of the total annual (insert fuel consumption, run times) for the (specify the affected vessels or equipment) with a limit of (insert limit in gallons/year, limit in hours/year) and provide the information to the Bureau of Ocean Energy Management's (BOEM's) Regional Supervisor, Office of Leasing and Plans, Plans Section annually by February 1st of each year, beginning in the year (insert year). If no activities were conducted during a calendar year, provide a statement to that effect in lieu of the required records. If at any time during the applicant's activities these records indicate that the NO_x annual emissions may exceed the annual limit approved in your plan or the total annual (insert fuel consumption, run time) limit, the applicant must immediately prepare a revised plan pursuant to 30 CFR § 550.283 to include the recalculated emissions amounts. The applicant will not proceed with the actions that could cause the potential annual increase in emissions until the revised plan has been submitted to and approved by BOEM.
2.08	Potential to Exceed SO_2 Significance Levels (flaring)	Should hydrogen sulfide (H_2S) concentrations greater than (insert number) ppm be encountered, the 3- and 24-hour sulphur oxides (SO_2) onshore ambient air concentration significance levels as prescribed by 30 CFR § 550.303(e) could be exceeded during the proposed well test flaring. Therefore, the applicant is advised that, should H_2S concentrations greater than (insert number) ppm be encountered, they shall use the graph included in their plan to determine the maximum allowable flow rate for the flaring operation. The applicant is responsible for ensuring that their maximum emission concentrations remain below the aforementioned significance levels. In accordance with 30 CFR § 250.1164(c), the applicant is hereby required to submit monthly reports that contain the following: (1) the daily volume and duration (number of hours) of each flaring episode; (2) the H_2S concentration (ppm) in the flared gas; and (3) the calculated amount of SO_2 emitted.

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
2.11	Using Ultra-Low Sulfur Content Fuel	As proposed, use ultra-low sulfur content diesel fuel (sulfur concentration 0.0015% or less by weight) while conducting these operations. Sulfur content records must be maintained on the platform and made available to authorized BSEE personnel upon request.
2.12	Verification of Emissions Factors (clean burn engines)	The rating, manufacturer, and type of engine(s) proposed in the applicant's plan will be operated and maintained in accordance with the manufacturer's specifications. Using a U.S. Environmental Protection Agency (USEPA)-approved or equivalent method, perform an emissions stack test on the subject engine(s) within 60 days following installation and at least every 3 years thereafter. These tests will be performed at loads representing 25, 50, 75, and 100 percent of the rated capacity or at minimum, average, and highest operational loads to verify that the emission factors are not exceeding those used in calculating the proposed emissions in the plan. Prepare a report of the results of each stack test and submit it to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section within 45 days of the test. During engine operation, the applicant will maintain the baseline parameters (such as air-fuel rations) established during the most recent successful stack test. The applicant must monitor and record these parameters daily to ensure consistency with those observed during the most recent successful stack test. Records of these parameters must be maintained on the platform and made available to authorized BSEE personnel upon request. In addition, the applicant must submit this information to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section annually by February 1st of each year, beginning in the year (insert year). If no activities were conducted during a calendar year, provide a statement to that effect in lieu of the required records.
2.13	Monitoring of NO_x Emissions (catalytic converters)	The rating, manufacturer, and type, and catalytic converter(s) proposed in the plan must be operated and maintained in accordance with the manufacturer's specifications. Using a USEPA-approved or equivalent method, perform an emissions stack test on the subject engine(s) and catalytic converter(s) within 60 days following installation and at least every 3 years thereafter. These tests will be performed at loads representing 25, 50, 75, and 100 percent of the rated capacity or at minimum, average, and highest operational loads to verify that the emissions factors are not exceeding those used in calculating the proposed emissions in the plan. The applicant must contact BSEE at least 30 days prior to conducting the test to determine proper protocol for the stack test and also to have BSEE's representative witness the test. Prepare a report of the results of each stack test and submit it to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section within 45 days of the test.

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		During operation, the applicant will maintain the baseline parameters, such as air-fuel ratios for the engine(s) and the pressure drop and temperature increase across the catalytic converter(s) established during the most recent successful stack test. The applicant must monitor and record these parameters daily to ensure they remain consistent with those observed during the most recent successful stack test. The records of these parameters will be maintained on the platform and made available to authorized BSEE personnel upon request. In addition, the applicant must submit this information to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section annually by February 1st of each year, beginning in the year (insert year). If no activities were conducted during a calendar year, the applicant must provide a statement to that effect in lieu of the required records.
2.15	Sulfur Recovery Unit, Flaring Episodes, Production Curtailment	If a shutdown of the sulfur recovery unit necessitates diverting the acid gas stream and if the resulting increased emissions would cause the SO_2 onshore ambient air concentration significance levels as prescribed by 30 CFR § 550.303(e) to be exceeded, begin curtailing production within 6 hours of the onset of the increased emissions. If curtailment is necessary, the appropriate reduced production rate will be reached no later than 8 hours from the onset of the increased emissions and will continue until such time that normal operation of the sulfur recovery unit can resume.
2.16	Monitoring of SO_2 Emissions (sulfur recovery units)	The amine unit and the (specify name of sulfur recovery unit) proposed in the plan must be operated and maintained in accordance with the manufacturer's specifications. Using a USEPA-approved or equivalent method, perform an emissions stack test on the subject sulfur recovery unit within 60 days following installation. This test will be performed at loads representing 25, 50, 75, and 100 percent of the rated capacity of the amine unit or at minimum, average, and highest operational loads of the amine unit to verify that the emission factors are not exceeding those used in calculating the proposed emissions in the plan. Contact BSEE's Environmental Enforcement Division at least 30 days prior to conducting the test to determine proper protocol for the stack test and also to have BSEE's representative witness the test. Prepare a report of the results of each stack test and submit it to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section within 45 days of the test. The applicant must monitor and record these parameters daily to ensure they remain consistent with the approved baseline parameters from the most recent successful stack test. Records of these parameters must be maintained on the platform and made available to authorized BSEE personnel upon request. In addition, the applicant must

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		submit this information to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section annually by February 1st of each year, beginning in the year (insert year). If no activities were conducted during a calendar year, provide a statement to that effect in lieu of the required records.
2.17	Verification of Emissions Factors (general)	The rating, manufacturer, and type of engine(s) proposed in the plan will be operated and maintained in accordance with the manufacturer's specifications. Using a USEPA-approved or equivalent method, perform an emissions stack test on the subject engine(s) within 60 days following installation and at least every 3 years thereafter. These tests will be performed at loads representing 25, 50, 75, and 100 percent of the rated capacity or at minimum, average, and highest operational loads to verify that the emission factors are not exceeding those used in calculating the proposed emissions in the plan. Contact BSEE's Environmental Enforcement Division at least 30 days prior to conducting the test to determine proper protocol for the stack test and also to have BSEE's representative witness the test. Prepare a report of the results of each stack test and submit it to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section within 45 days of the test. During engine operation, the applicant will maintain the baseline parameters (such as air-fuel rations) established during the most recent successful stack test. The applicant must monitor and record these parameters daily to ensure consistency with those observed during the most recent successful stack test. Records of these parameters must be maintained on the platform and made available to authorized BSEE personnel upon request. In addition, the applicant must submit this information to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section annually by February 1st of each year, beginning in the year (insert year). If no activities were conducted during a calendar year, provide a statement to that effect in lieu of the required records.
2.18	Alternative Monitoring of NO_x Emissions (catalytic converters)	Using your established baseline parameters listed below, monitor the performance of the engine(s) and catalytic converter(s) and record daily to ensure that performance remains consistent. Air to fuel ratio for engine: (insert baseline parameters); pressure drop across catalytic converter: (insert baseline parameters); and temperature increase across catalytic converter: (insert baseline parameters). Records of these parameters must be maintained on the platform and made available to authorized BSEE personnel upon request. In addition, the applicant must submit a summary of these data to BOEM's Regional Supervisor, Office of Leasing and Plans,

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		Plans Section annually by February 1st of each year, beginning in the year (insert year). The summary will report minimum, average, and maximum values for the above-listed parameters, on a monthly basis, for the year. If no activities were conducted during a calendar year, provide a statement to that effect in lieu of the required records. Notify BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section as soon as practical but no later than 24 hours after the event, whenever the engine(s) or catalytic converter(s) exceed these parameters for periods greater than a day. File a detailed report with this office within 5 days of the termination of any such event. At a minimum, this report will include a chronology of the event, NO_x emissions rates in pounds per hour, total NO_x emissions for the duration of the event, and any measures taken to regain operation within these parameters or to prevent a recurrence of similar events. If exceeding the above parameters results in increased emissions that would cause onshore NO_x concentration to exceed BOEM significance levels (30 CFR § 550.303(e)), curtail the use of the (identify equipment associated with catalytic converter) within 2 days of the onset of the increased emissions and continue curtailment until such time that normal operation of the catalytic converter can resume.
Archaeology Mitigations		
3.00	Archaeology Non-Recurring Mitigation	A non-recurring mitigation is a mitigating measure that is used for a unique, special, one-time-only mitigation that is added to certain plans.
3.02	Buried Channels (pipeline applications)	BOEM's review indicates that the proposed activities are in the vicinity of buried channel margin features that may contain significant archaeological resources. In accordance with 30 CFR § 250.1007(a)(5), the applicant must either (1) conduct an underwater archaeological investigation (diver and/or remotely operated vehicle (ROV) investigations) prior to commencing activities to determine whether these features represent archaeological resources or (2) ensure that the depth of the pipeline trench in the vicinity of these features does not exceed 3 ft and that all other seafloor-disturbing actions resulting from the proposed activities avoid the subject channel margins (see the enclosed map depicting the avoidance area in the application). If the applicant conducts an underwater archaeological investigation prior to commencing operations, the applicant should contact BOEMs' Office of Environment and BSEE's Environmental Enforcement Branch at least 2 weeks prior to performing operations to obtain the investigation methodology. If the applicant chooses to avoid the features, then the applicant should submit anchor position plats, at a scale of 1 in = 1,000 ft with differential global positioning system (DGPS) accuracy, with your pipeline construction report required by 30 CFR § 250.1008(b). These plats must depict the "as-placed" location of all anchors, anchor

Table B-1. Commonly Applied or “Standard” Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		chains, wire ropes, and cables on the seafloor (including sweep) and demonstrate that the features were not physically impacted by the construction activities. If the applicant chooses to avoid the features and no anchoring activities were conducted during pipeline construction, provide a statement to that effect in lieu of the required anchor position plats. This mitigation may be applied by BSEE at the post-approval stage.
3.03	Buried Channels (plans)	BOEM’s review indicates that the proposed activities are in the vicinity of buried channel margin features that may contain significant archaeological resources. In accordance with 30 CFR § 550.194, the applicant must either (1) conduct an underwater archaeological investigation (diver and/or ROV investigations) prior to commencing activities to determine whether these features represent archaeological resources or (2) ensure that all seafloor-disturbing actions resulting from the proposed activities avoid the subject features (see the enclosed map depicting the avoidance area in the application). If the applicant conducts an underwater archaeological investigation prior to commencing operations, contact BOEM’s Office of Environment least 2 weeks prior to performing operations to obtain the investigation methodology. If the applicant chooses to avoid the features, then submit an as-built map at a scale of 1 in = 1,000 ft with DGPS accuracy, showing the location of all seafloor disturbances (e.g., the rig or platform, anchors, anchor chains, wire ropes, cables, etc.) relative to these features, to BOEM’s Regional Supervisor, Office of Leasing and Plans, Plans Section at the same time that the applicant submits its (specify submittal type).
3.04 and 3.05	Magnetic Anomalies and/or Side-Scan Sonar Targets (pipeline applications - multiple features) Magnetic Anomalies and/or Side-Scan Sonar Targets (pipeline application – singular feature)	BOEM’s review indicates that the proposed activities are in the vicinity of the unidentified (insert magnetic anomalies, side-scan sonar targets, magnetic anomalies and side-scan sonar targets) listed in the enclosure, features that may represent significant archaeological resources. In accordance with 30 CFR § 250.1007(a)(5), the applicant must either (1) conduct an underwater archaeological investigation (diver and/or ROV investigations) prior to commencing activities to determine whether these features represent archaeological resources or (2) ensure that all seafloor-disturbing actions resulting from the proposed activities avoid the unidentified features by a distance greater than that listed in the enclosure. If the applicant conducts an underwater archaeological investigation prior to commencing operations, then the applicant must contact BOEM’s Office of Environment at least 2 weeks prior to performing operations to obtain the investigation methodology. If the applicant chooses to avoid the features, then submit anchor position plats, at a scale of 1 in = 1,000 ft with DGPS accuracy, with the pipeline construction report required by 30 CFR § 250.1008(b). These plats must depict the

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		"as-placed" location of all anchors, anchor chains, wire ropes, and cables on the seafloor (including sweep) and demonstrate that the features were not physically impacted by the construction activities. If the applicant chooses to avoid the features and no anchoring activities were conducted during pipeline construction, then provide a statement to that effect in lieu of the required anchor position plats. This mitigation may be applied by BSEE at the post-approval stage.
3.06 and 3.07	Magnetic Anomalies and/or Side-Scan Sonar Targets (plans – multiple features) Magnetic Anomalies and/or Side-Scan Sonar Targets (plans – singular feature)	BOEM's review indicates that the proposed activities are in the vicinity of the unidentified (insert magnetic anomalies, side-scan sonar targets, magnetic anomalies and side-scan sonar targets) listed in the enclosure of the application, features that may represent significant archaeological resources. In accordance with 30 CFR § 550.194, the applicant must either (1) conduct an underwater archaeological investigation (diver and/or ROV investigations) prior to commencing the activities to determine whether these features represent archaeological resources or (2) ensure that all seafloor-disturbing actions resulting from the proposed activities avoid the subject features by a distance greater than that listed in the enclosure of the application. If the applicant conducts an underwater archaeological investigation, then the applicant must contact BOEM's Office of Environment at least 2 weeks prior to performing operations to obtain the investigation methodology. If the applicant chooses to avoid the features, submit an as-built map at a scale of 1 in = 1,000 ft with DGPS accuracy, showing the location of all seafloor disturbances (e.g., the rig or platform, anchors, anchor chains, wire ropes, cables, etc.) relative to these features to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section at the same time the applicant submits the plan.
3.08	Buried Channels (lease block survey review	BOEM's review of the archaeological assessment indicates that there are buried channel margin features that may contain significant archaeological resources in the lease block(s). The enclosed map in the application identifies the areas to be avoided during any future development within the block(s). In accordance with 30 CFR § 550.194, the applicant must either (1) conduct an underwater archeological investigation (diver and/or ROV investigations) to determine whether these features represent archaeological resources or (2) ensure that all seafloor-disturbing actions required by future exploration or development will avoid the subject features. If the applicant chooses to conduct an underwater archaeological investigation, then the applicant must contact BOEM's Office of Environment at least 2 weeks prior to performing operations to obtain the investigation methodology.

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
3.09 and 3.10	Magnetic Anomaly and/or Side-Scan Sonar Target (survey review – single feature) Magnetic Anomaly and/or Side-Scan Sonar Target (survey review – multiple features)	BOEM's review of the archaeological assessment indicates the presence of the unidentified magnetic anomaly(ies), side-scan sonar target(s), or magnetic anomaly(ies) and side-scan sonar target(s) listed in the enclosure of the application, features that may represent significant archaeological resources. In accordance with 30 CFR § 550.194, the applicant must either (1) conduct an underwater archaeological investigation (diver and/or ROV investigations) to determine whether these features represent archaeological resources or (2) ensure that all seafloor-disturbing actions required by future exploration and development avoid the unidentified features by a distance greater than that listed in the enclosure of the application. If the applicant conducts an underwater archaeological investigation, then the applicant must contact BOEM's Office of Environment at least 2 weeks prior to performing operations to obtain the investigation methodology.
3.11	Unsurveyed Area (plans)	Avoid impacts to the seafloor in the unsurveyed area approximately (insert number) feet to the (insert direction) of the proposed (specify Well X, Wells X and Y, Platform X, etc.). This area has been identified as requiring a (insert 50-meter or 300-meter) line spacing archaeological resource survey to determine the potential for archaeological resources. BOEM has no archaeological resource assessment on file for this area and, therefore, cannot determine the potential effects to archaeological resources outside of the applicant's survey coverage. Submit an as-built map at a scale of 1 in = 1,000 ft with DGPS accuracy, showing the location of all seafloor disturbances (e.g., the rig or platform, anchors, anchor chains, wire ropes, cables, etc.) relative to the unsurveyed area to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section at the same time the applicant submits the plan.
3.12 and 3.13	Magnetic Anomalies and/or Side-Scan Sonar Targets (structure removals – multiple features) Magnetic Anomalies and/or Side-Scan Sonar Targets (structure removals – single feature)	BOEM's review indicates that the proposed activities are in the vicinity of the unidentified magnetic anomaly(ies), side-scan sonar target(s), or magnetic anomaly(ies) and side-scan sonar target(s) listed in the table in the application, a feature that may represent a significant archaeological resource. In accordance with 30 CFR § 250.194(c), the applicant must either (1) conduct an underwater archaeological investigation (diver and/or ROV investigations) prior to commencing activities to determine whether this feature represents an archaeological resource or (2) ensure that all anchoring operations (e.g., anchors, anchor chains, wire ropes, cables, etc.) avoid the unidentified feature by a distance greater than that listed in the table in the application. If the applicant plans to conduct an underwater archaeological investigation prior to commencing operations, then the applicant must contact BOEM's Office of Environment to obtain the investigation methodology at least 2 weeks prior to performing operations and contact BOEM's Office of Environment and BSEE's Environmental Enforcement Branch. If the applicant chooses to

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		avoid the feature, then include in the post-removal report as-built plats, at a scale of 1 in = 1,000 ft with DGPS accuracy, the position of anchors, anchor chains, wire ropes, and cables deployed during the structure removal relative to the feature. In addition, supply a copy of ALL vessel logs related to the removal operations (e.g., anchor handling vessels, lift boats, dive vessels, and tug boats). This mitigation may be applied by BSEE at the post-approval stage.
3.16	ROV Surveys (plans)	The proposed operations are in an area designated by BOEM's Regional Director as having a high potential for the location of historic shipwrecks. In accordance with 30 CFR § 550.194(a)(2), prior to commencing the operations, conduct an ROV investigation (using video, sector-scanning sonar, or multibeam bathymetry) of the seafloor areas that could be disturbed by the operations (e.g., the rig or platform, anchors, anchor chains, wire ropes, cables, etc.) to ensure that the applicant will avoid harming potentially significant archaeological sites. The applicant must contact BOEM's Office of Environment at least 2 weeks prior to performing operations to obtain the investigation methodology. The applicant must submit a report of this investigation prepared by a qualified marine archaeologist, along with an "as-placed" anchor plat and copies of the ROV video and acoustic recordings of the investigation to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section at the same time the applicant submits the plan. If the applicant discovers any potential archaeological resource (i.e., cannot be definitively identified as modern debris or refuse) while conducting this investigation or future operations, the applicant must immediately halt any seafloor-disturbing activities and report the discovery to BOEM's Regional Supervisor, Office of Environment.
3.17	Conditional Approval for ROV Surveys (plans)	Drilling permits will not be issued for proposed well(s) and well name(s) until the applicant submits an archaeological report to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section and receives approval. This report must be based on an ROV investigation (using video, sector-scanning sonar, or multibeam bathymetry) of the seafloor areas that could be disturbed by the operations. The report must be prepared by a qualified marine archaeologist and must include copies of the ROV video and acoustic recordings of the investigation, along with an "as-placed" anchor plat. If the applicant discovers any potential archaeological resource (i.e., cannot be definitively identified as modern debris or refuse) while conducting this investigation, the applicant must immediately halt any seafloor-disturbing activities and report the discovery to BOEM's Regional Supervisor, Office of Environment. The applicant must contact BOEM's Office of Environment at least 2 weeks prior to performing this survey to obtain the investigation methodology.

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
3.18	Buried Channels (structure removal)	BOEM's review indicates that the proposed activities are in the vicinity of buried channel margin features that may contain significant archaeological resources. In accordance with 30 CFR § 250.194(c), the applicant must either (1) conduct an underwater archaeological investigation (diver and/or ROV investigations) prior to commencing activities to determine whether these features represent archaeological resources or (2) ensure that all seafloor-disturbing actions resulting from the proposed activities (e.g., site-clearance trawling, anchors, anchor chains, wire ropes, cables, etc.) avoid the subject features (see the enclosed map depicting the avoidance area in the application). If the applicant plans to conduct an underwater archaeological investigation prior to commencing operations, then the applicant must contact BOEM's Office of Environment at least 2 weeks prior to performing operations to obtain the investigation methodology and contact BOEM's, Office of Environment and BSEE's Environmental Enforcement Branch. If the applicant chooses to avoid the features, then include in the post-removal report as-built plats, at a scale of 1 in = 1,000 ft with DGPS accuracy, the position of anchors, anchor chains, wire ropes, and cables deployed during the structure removal relative to these features. In addition, supply a copy of ALL vessel logs related to the removal operations (e.g., anchor handling vessels, lift boats, dive vessels, and tug boats). This mitigation may be applied by BSEE at the post-approval stage.
3.20	Avoidance of Potential Archaeological Resources	BOEM's review indicates that the proposed operations have the potential to impact submerged archaeological resources that could be in the area of potential effect, which encompasses all portions of the seafloor where bottom-disturbing activities are to occur. Before conducting any authorized, bottom-disturbing activities, the company will follow the guidance provided at http://www.boem.gov/Environmental-Stewardship/Archaeology/Gulf-of-Mexico-Archaeological-Information.aspx, which includes minimum survey recommendations, requisite certification submittals, and post-activity reporting standards needed to ensure compliance with the regulations under 30 CFR § 550.194. This mitigation may be applied by BSEE at the post-approval stage.
3.21 and 3.22	Side-Scan Sonar Targets (site clearance – single features) Side-Scan Sonar Targets (site clearance – multiple features)	BOEM's review indicates that the proposed activities are in the vicinity of the unidentified side-scan sonar target(s) listed in the table in the application, features that may represent significant archaeological resources. In accordance with 30 CFR § 250.194(c), the applicant must conduct an underwater archaeological investigation (diver and/or ROV investigation) under the supervision of a professional archaeologist to determine whether these features represent archaeological resources potentially eligible to the National Register of Historic Places prior to conducting site-clearance trawling activities. This mitigation may be applied by BSEE at the post-approval stage.

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
3.23	Protection of Potential Archaeological Resources (all structure removals)	Per 30 CFR § 250.194(c) and clarified in 2005-G07, if, during site-clearance operations the applicant discovers any object of potential archaeological significance, the applicant is required to immediately halt operations. In addition, the applicant must immediately report this discovery to BSEE's Environmental Enforcement Branch. Additional guidance will be provided to the applicant as to what steps will be needed to protect any potentially submerged archaeological resources. In order for BSEE to ensure compliance with 30 CFR § 250.194(c) and as specified under 30 CFR § 250.1743, the applicant is required to provide the trawling logs for both heavy-duty nets and verification nets, with descriptions of each item recovered. Should the applicant only pull site-clearance verification nets, the applicant must clearly state this within the body of the Site-Clearance Report. The applicant is also requested to provide the following as an appendix in the Site-Clearance Report: a CD or DVD of all digital photographs of the items recovered during the use of both the heavy-duty trawl nets and the site-clearance verification trawl nets. This mitigation may be applied by BSEE at the post-approval stage.
		Artificial Reef Material Mitigations
4.01	Louisiana (artificial reef area)	The proposed anchoring operations are located within 500 ft (152 m) of an artificial reef permit area established by the State of Louisiana. At least 2 weeks prior to conducting anchoring operations (including the use of anchors, anchor chains, and wire ropes) that could disturb the seafloor within 500 ft (152 m) of an artificial reef permit area, the applicant must contact the Louisiana Artificial Reef Coordinator to ensure that the proposed anchoring operations do not damage reefal material. Prior to conducting anchoring operations, the applicant must send an email to BSEE's Environmental Enforcement Branch confirming that the Louisiana Artificial Reef Coordinator has been contacted. If the anchoring operations intersect or cross-over the artificial reef permit area, then submit anchor position plats, at a scale of 1 in = 1,000 ft with DGPS accuracy, depicting the "as-placed" location of all anchors, anchor chains, wire ropes, and cables (including sweep if applicable) on the seafloor relative to the reefal material. For plans, submit the plats to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section at the same time the applicant submits the End of Operations Report (Form BSEE-0125) to the appropriate BSEE, Gulf of Mexico OCS Region, District Office and/or notification of platform installation date and final as-built location data as directed in 30 CFR § 250.900(e). For pipelines, submit the plats with the pipeline construction report required by 30 CFR § 250.1008(b). For structure removals, submit the plats with the post-removal

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		report. This mitigation may be applied by BSEE at the post-approval stage.
4.02	Texas (artificial reef general permit area)	The proposed operations are located within an artificial reef General Permit Area established by the State of Texas. At least 2 weeks prior to conducting operations (including the use of anchors, anchor chains, and wire ropes) that could disturb the seafloor within the artificial reef General Permit Area, contact the Texas Artificial Reef Coordinator to ensure that the proposed operations do not damage reefal material. Prior to conducting operations, the applicant must send an email to BSEE's Environmental Enforcement Branch confirming that the Texas Artificial Reef Coordinator has been contacted. This mitigation may be applied by BSEE at the post-approval stage.
4.021	Texas (artificial reef permit area – anchoring)	The proposed anchoring operations are located within 1,000 ft (305 m) of an artificial reef permit area established by the State of Texas. At least 2 weeks prior to conducting anchoring operations (including the use of anchors, anchor chains, and wire ropes) that could disturb the seafloor within 1,000 ft (305 m) of the artificial reef permit area, contact the Texas Artificial Reef Coordinator to ensure that the proposed anchoring operations do not damage reefal material. Prior to conducting anchoring operations, the applicant must send an email to BSEE's Environmental Enforcement Branch confirming that the Texas Artificial Reef Coordinator has been contacted. If the anchoring operations intersect or cross-over the artificial reef permit area, submit anchor position plats, at a scale of 1 in = 1,000 ft with DGPS accuracy, depicting the "as-placed" location of all anchors, anchor chains, wire ropes, and cables (including sweep if applicable) on the seafloor relative to the reefal material. For plans, submit the plats to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section at the same time the applicant submits the End of Operations Report (Form BSEE-0125) to the appropriate BSEE, Gulf of Mexico OCS Region, District Office and/or notification of platform installation date and final as-built location data as directed in 30 CFR § 250.900(e). For pipelines, submit the plats with the pipeline construction report required by 30 CFR § 250.1008(b). For structure removals, submit the plats with the post-removal report. This mitigation may be applied by BSEE at the post-approval stage.
4.03	Mississippi (artificial reef area)	The proposed anchoring operations are located within 500 ft (152 m) of an artificial reef permit area established by the State of Mississippi. At least 2 weeks prior to conducting anchoring operations (including the use of anchors, anchor chains, and wire ropes) that could disturb the seafloor within 500 ft (152 m) of an artificial reef structure or an artificial reef permit area, contact the Mississippi Artificial Reef Coordinator to ensure that the proposed anchoring operations do not damage reefal material. Prior to conducting

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		anchoring operations, the applicant must send an email to BSEE's Environmental Enforcement Branch confirming that the Mississippi Artificial Reef Coordinator has been contacted. This mitigation may be applied by BSEE at the post-approval stage.
4.04	Alabama (artificial reef general permit area)	The proposed operations are in a General Permit Area established by the State of Alabama for the placement of artificial reef material. At least 2 weeks prior to conducting operations, contact the Alabama Artificial Reef Coordinator to ensure that the proposed operations do not damage reefal material. Prior to conducting operations, the applicant must send an email to BSEE's Environmental Enforcement Branch confirming that the Alabama Artificial Reef Coordinator has been contacted. This mitigation may be applied by BSEE at the post-approval stage.
4.05	Florida (artificial reef general permit area)	The proposed operations are in a General Permit Area established by the State of Florida for the placement of artificial reef material. At least 2 weeks prior to conducting operations, contact the Florida Artificial Reef Coordinator to ensure that the proposed operations do not damage reefal material. Prior to conducting operations, the applicant must send an email to BSEE's Environmental Enforcement Branch confirming that the Florida Artificial Reef Coordinator has been contacted. This mitigation may be applied by BSEE at the post-approval stage.
4.06	Post-Reefing Survey Requirements	BOEM's review indicates that the structure proposed for decommissioning will be abandoned-in-place as an artificial reef under the Rigs-to-Reefs Program. In order to verify compliance with OCSLA reefing (30 CFR § 250.1727(g)) and obstruction clearance requirements (30 CFR § 250.1740(a)(2)), the applicant is required to conduct a high-resolution sonar survey (500 kHz or greater) of the permitted reefal material. The applicant must design the line spacing (for side-scan) or sonar drops (for sector-scanning) and the display range to ensure that 100 percent of the material permitted under this action is covered and that it is demonstrated that the associated seabed is clear of all obstructions apart from the reefal material. The applicant is required to submit the sonar data/survey report to BSEE's Environmental Enforcement Branch at the same time as the post-removal report. This mitigation may be applied by BSEE at the post-approval stage.
	Chemosynthetic Communities Mitigations	
5.00	Chemosynthetic Communities Non-Recurring Mitigation	A non-recurring mitigation is a mitigating measure that is used for a unique, special, one-time-only mitigation that is added to certain plans.
5.01	Anchor Positioning (GPS) (plans)	The proposed activities are in the vicinity of areas that could support high-density deepwater benthic communities. Use a state-of-the-art positioning system (e.g., DGPS) on the anchor handling vessel to ensure that any seafloor disturbance resulting from the

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		use of anchors (including that caused by the anchors, anchor chains, and wire ropes) does not occur within 250 ft (76 m) of such areas (see the enclosed map/Map xxx [specify map by name], submitted with the survey report, which depicts the areas). Submit plats for Well(s) (insert number[s] or name[s]), which depict the "as-placed" location of all anchors and any associated anchor chains and wire ropes on the seafloor, at a scale of 1 in = 1,000 ft with DGPS accuracy, to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section at the same time the applicant submits the End of Operations Report (Form BSEE-0125) to the appropriate BSEE, Gulf of Mexico OCS Region, District Office to demonstrate that the features were not physically impacted by these anchoring activities. This mitigation may be applied by BSEE at the post-approval stage.
5.02	Conventional Pipeline Laying Vessels (GPS) (pipeline applications)	The proposed pipeline construction activities are in the vicinity of areas that could support high-density deepwater benthic communities. Use a state-of-the-art positioning system (e.g., DGPS) on the pipeline laying vessel and the anchor handling vessels to ensure that any seafloor disturbance (including that caused by anchors, anchor chains, and wire ropes) during pipeline construction activities does not occur within 250 ft (76 m) of such areas (see the enclosed map/Map xxx [specify map by name], submitted with the pipeline application, which depicts the areas). Additionally, include lay barge anchor position plats, at a scale of 1 in = 1,000 ft with DGPS accuracy, with the pipeline construction report required by 30 CFR § 250.1008(b), which depict the "as-placed" location of all anchors, anchor chains, and wire ropes on the seafloor and which demonstrate that the features were not physically impacted by the construction activities. This mitigation may be applied by BSEE at the post-approval stage.
5.03	Anchor Positioning (ROV) (plans)	The proposed activities are in the vicinity of areas that could support high-density deepwater benthic communities. Use an ROV to ensure that any seafloor disturbance resulting from the use of anchors (including that caused by the anchors, anchor chains, and wire ropes) does not occur within 250 ft (76 m) of such areas (see the enclosed map/Map xxx [specify map by name], submitted with your survey report which depicts the areas). Submit plats for Well(s) (insert number[s] or name[s]), which depict the "as-placed" location of all anchors and any associated anchor chains and wire ropes on the seafloor, at a scale of 1 in = 1,000 ft with DGPS accuracy, along with the high-resolution ROV video on disc or removable drive, to BOEM's Regional Supervisor, Office of Leasing and Plans, Plans Section at the same time the applicant submits the End of Operations Report (Form BSEE-0125) to the appropriate BSEE, Gulf of Mexico OCS Region, District Office to demonstrate that the features were not physically impacted by these anchoring activities. The ROV video screen should show time, date, depth,

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		heading, and location coordinates. Observational notes and a corresponding map showing the ROV heading shall also be provided. If still images are collected, include the same information in the images' integrated data. This mitigation may be applied by BSEE at the post-approval stage.
5.04	Conventional Pipeline Laying Vessels (ROV) (pipeline applications)	The proposed pipeline construction activities are in the vicinity of areas that could support high-density deepwater benthic communities. Use an ROV to ensure that any seafloor disturbance (including that caused by the anchors, anchor chains, and wire ropes) during pipeline construction activities does not occur within 250 ft of such areas (see the enclosed map/Map "xxx" [specify map by name], submitted with the pipeline application, which depicts the areas). Submit lay barge anchor position plats, at a scale of 1 in = 1,000 ft with DGPS accuracy, with the pipeline construction report required by 30 CFR § 250.1008(b), which depict the "as-placed" location of all anchors, anchor chains, and wire ropes on the seafloor and which demonstrate that the features were not physically impacted by the construction activities. Additionally, submit the high-resolution ROV video on disc or removable drive. The ROV video screen should show time, date, depth, heading, and location coordinates. Observational notes and a corresponding map showing the ROV heading shall also be provided. If still images are collected, include the same information in the images' integrated data. This mitigation may be applied by BSEE at the post-approval stage.
5.05	Dynamically Positioned Pipeline Laying Vessels (GPS) (pipeline applications)	The proposed pipeline construction activities are in the vicinity of areas that could support high-density deepwater benthic communities. Use a state-of-the-art positioning system (e.g., DGPS) on the dynamically positioned pipeline laying vessel to ensure that any seafloor disturbance resulting from the pipeline construction activities does not occur within 250 ft (76 m) of such areas (see the enclosed map/Map "xxx" [specify map by name], submitted with the pipeline application, which depicts the areas). Additionally, include "as-built" location plats, at a scale of 1 in = 1,000 ft with DGPS accuracy, with the pipeline construction report required by 30 CFR § 250.1008(b), which depict the location of the pipeline(s) relative to these features to demonstrate that the features were not physically impacted by the construction activities. This mitigation may be applied by BSEE at the post-approval stage.
5.07	Anchor Positioning (GPS and ROV)	The proposed activities are in the vicinity of areas that could support high-density deepwater benthic communities. Use a state-of-the-art positioning system (e.g., DGPS) on the anchor handling vessel and use an ROV to ensure that any seafloor disturbance resulting from the use of anchors (including that caused by the anchors, anchor chains, and wire ropes) does not occur within 250 ft (76 m) of such areas. Submit plats for Well(s)

Table B-1. Commonly Applied or “Standard” Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		(insert number[s] or name[s]), which depict the “as-placed” location of all anchors and any associated anchor chains and wire ropes on the seafloor, at a scale of 1 in = 1,000 ft with DGPS accuracy, along with the high-resolution ROV video on disc or removable drive, to BOEM’s Regional Supervisor, Office of Leasing and Plans, Plans Section at the same time the applicant submits the End of Operations Report (Form BSEE-0125) to the appropriate BSEE, Gulf of Mexico OCS Region, District Office to demonstrate that the features were not physically impacted by these anchoring activities. The ROV video screen should show time, date, depth, heading, and location coordinates. Observational notes and a corresponding map showing the ROV heading shall also be provided. If still images are collected, include the same information in the images’ integrated data. This mitigation may be applied by BSEE at the post-approval stage.
5.08	Well Placement Variance (plans)	There is an area capable of supporting high-density deepwater benthic communities within 2,000 ft (610 m) of the proposed well(s), also known as the chemosynthetic well parameter. The proposed well(s) is/are (insert chemosynthetic distance parameter) from the area capable of supporting high-density deepwater benthic communities, which in this case provides adequate protection from muds and cuttings during operations. The actual well(s) shall not be placed closer than (CHEMO DISTANCE PARAMETER 1) from the potential habitat (see the chemosynthetic map parameter, which depicts the area). Provide a map showing the final as-placed well(s), potential habitat, and distance of the well(s) from the potential habitat to BOEM’s Regional Supervisor, Office of Leasing and Plans, Plans Section at the same time the applicant submits the End of Operations Report (Form BSEE-0125) to the appropriate BSEE, Gulf of Mexico OCS Region, District Office to demonstrate that the feature(s) were not physically impacted by the drilling activity. This mitigation may be applied by BSEE at the post-approval stage.
5.09	Well Placement Variance – “Zero Discharge” (plans)	There is an area capable of supporting high-density deepwater benthic communities within 2,000 ft (610 m) of the proposed well(s) (insert chemosynthetic wells parameter). Since this area is (insert chemosynthetic distance parameter) from your well site(s), chemosynthetic reason parameter, BSEE permits the activity with the following mitigations added. • Do not move the well(s) any closer to the area capable of supporting high-density deepwater benthic communities (see chemosynthetic map parameter, which depicts the area). • Follow “zero discharge” practices (i.e., no muds or cuttings shall be discharged near the sea surface in the vicinity of the permitted activity). • In this instance, it is understood that the discharge of muds and cuttings will

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		occur on or near the seafloor for the riserless portion of the drilling operations ONLY as part of the "zero discharge" practice. • No muds or cuttings shall be discharged near the seafloor or at the sea surface once the blowout preventer and marine riser have been installed. No additional or excess muds or cuttings beyond those necessary to properly accomplish the riserless portion of the drilling activity shall be discharged on or near the seafloor. • Perform an assessment survey after the drilling of the well(s) is complete. (a) Conduct an ROV survey to assess sedimentation and its effects on the area capable of supporting high-density deepwater benthic communities (see chemosynthetic map parameter 1, which depicts the area. Transects must be run no more than 50 ft apart). (b) Ensure that the imagery in the ROV survey is high enough quality to adequately assess drilling effects. (This can be accomplished by employing the use of high-resolution still photography, high-resolution video, and/or lower resolution imaging through the use of close-up photography.) (c) The surveyed areas shall be recorded and documented on disc or removable drive for review, and the screen should show time, date, depth, heading, and location coordinates. This mitigation may be applied by BSEE at the post-approval stage.
Coastal Zone Management Mitigations		
6.01	Texas (Coastal Zone Management)	Drilling permits cannot be issued for the proposed wells until concurrence with the coastal zone management consistency certification has been received by BOEM's Office of Environment from the Texas General Land Office or until concurrence with the certification has been conclusively presumed.
6.02	Louisiana (Coastal Zone Management)	Drilling permits cannot be issued for the proposed wells until concurrence with the coastal zone management consistency certification has been received by BOEM's Office of Environment from the Louisiana Department of Natural Resources or until concurrence with the certification has been conclusively presumed.
6.03	Alabama (Coastal Zone Management)	Drilling permits cannot be issued for the proposed wells until concurrence with the coastal zone management consistency certification has been received by BOEM's Office of Environment from the Alabama Department of Environmental Management or until concurrence with the certification has been conclusively presumed.
6.04	Mississippi (Coastal Zone Management)	Drilling permits cannot be issued for the proposed wells until concurrence with the coastal zone management consistency certification has been received by BOEM's Office of

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		Environment from the Mississippi Department of Marine Resources or until concurrence with the certification has been conclusively presumed.
6.05	Florida (Coastal Zone Management)	Drilling permits cannot be issued for the proposed wells until concurrence with the coastal zone management consistency certification has been received by BOEM's Office of Environment from the Florida Department of Environmental Protection or until concurrence with the certification has been conclusively presumed.
Flower Garden Banks Mitigations		
7.07	Environmental Monitoring Plan	Develop a plan for the early initiation of environmental monitoring of the effects of a hydrocarbon spill that may occur as a result of the proposed activities on the resources of the Flower Garden Banks National Marine Sanctuary, including water quality, pelagic fish, and benthic communities.
7.09	Pressure Sensor Testing	High- and low-pressure sensors protecting the proposed pipeline will be tested at least once bi-weekly with no more than 3 weeks elapsing between each test. The applicant will maintain these records on the platform and will make them available to BSEE personnel upon request.
7.10	Pressure Sensor Setting	The low-pressure sensor protecting the proposed pipeline will be set no lower than 10 percent below the lower limit of the normal operating pressure range.
Hydrogen Sulfide Mitigations		
8.01, 8.02, and 8.03	H_2S Present (plans) H_2S Unknown (plans) H_2S Absent (plans)	In response to the request accompanying your plan for a hydrogen sulfide (H_2S) classification, the area in which the proposed drilling operations are to be conducted is hereby classified, in accordance with 30 CFR § 250.490(c), as "H_2S present," "H_2S unknown," or "H_2S absent." Accordingly, comply with the appropriate requirements of 30 CFR § 250.490 if H_2S is present or unknown.
8.04	H_2S Concentration Deviation	The plan indicates that the applicant anticipates H_2S at a concentration of approximately (specify the ppm). Should the applicant actually encounter H_2S at a concentration greater than 500 ppm, revise the plan in accordance with 30 CFR § 550.285 to include toxic modeling and an analysis of any potential environmental impacts. Contact BOEM's Office of Environment to obtain the methodology for modeling an H_2S plume. The applicant must receive approval of the revised plan before additional permits filed under the plan will be approved.

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
8.05	Corrosion Inspections (H_2S pipelines)	Inspect the pipeline(s) bi-annually, annually, or biennially for an indication of corrosion or other flaws. Report the results of these inspections to BSEE's Office of Field Operations within 30 days of completion. This mitigation may be applied by BSEE at the post-approval stage.
8.07	National Ocean Service Notification (H_2S pipelines)	When the applicant provides the National Ocean Service, Nautical Data Section with a copy of the pipeline construction report plat, the applicant must also request that the National Ocean Service, Nautical Data Section include the pipeline(s) on their navigation charts and identify it/them as (an) H_2S or toxic sour gas pipeline(s).
8.08	USCG Notification (H_2S pipelines)	Immediately after the applicant begins operation of the pipeline(s), the applicant must notify the U.S. Coast Guard Commander, Eighth Coast Guard District that the pipeline(s) is/are in operation and request that USCG publish information about the pipeline(s), including the fact that it is or they are transporting natural gas with a high concentration of H_2S, in the Eighth District Local Notice to Mariners, Gulf of Mexico.
8.09	H_2S Concentration Deviation (pipeline applications)	The application indicated that the applicant anticipates the H_2S concentration of the product to be transported in the proposed pipeline is approximately (specify the ppm). Should the applicant determine at some future date that the H_2S concentration is greater than 500 ppm, immediately submit an application to modify the pipeline in accordance with 30 CFR § 250.1007(b) to include toxic modeling and an analysis of any potential environmental impacts. Contact BOEM's Office of Environment to obtain the methodology for modeling an H_2S plume.
8.10	Notification to Federal Aviation Administration	Prior to initiating operations approved in your plan or pipeline application, the applicant shall update their emergency notification list in their H_2S contingency plan to include the Federal Aviation Administration (FAA): Houston Air Traffic Control/Traffic Management Control Desk). In the event of an above-water or below-water sour gas release greater than 100 standard cubic feet, notify the FAA that air traffic (except evacuation and medical aircraft) should be routed safely away from the site until further notice. For purposes of avoidance recommendations to the FAA, a distance of 10 nmi (11.5 mi; 18.5 km) and an altitude of 4,000 ft (1,1219 m), as minimal, shall be used. In the case of a release of H_2S (that constitutes an emergency), notify all facilities that might be exposed to atmospheric concentrations of 20 ppm or more of H_2S (i.e., all facilities located within [insert number] miles of the H_2S release). The applicant must also assist in the removal of all personnel as well as any other persons observed within the affected area.
8.11	H_2S Absent and H_2S Present or Unknown below Certain Depths	In response to the request accompanying the plan for a H_2S classification, the area in which the proposed drilling operations are to be conducted above (specify depth) is hereby

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
	(plans)	classified, in accordance with 30 CFR § 250.490(c), as H_2S absent. However, the area in which the proposed drilling operations are to be conducted below (specify depth) is hereby classified, in accordance with 30 CFR § 250.490(c), as H_2S present or unknown. Accordingly, comply with the appropriate requirements of 30 CFR § 250.490.
Live Bottom Areas		
9.00	Hard Bottoms/Pinnacles/ Potentially Sensitive Biological Features Non-Recurring Mitigation	A non-recurring mitigation is a mitigating measure that is used for a unique, special, one-time-only mitigation that is added to certain plans.
9.01	Hard Bottoms/Pinnacles/ Potentially Sensitive Biological Features (conventional lay barge) (pipeline applications)	BOEM's analysis indicates that there are hard bottoms/pinnacles/potentially sensitive biological features (PSBFs) that likely provide habitat for biological assemblages located within the scope of the anchor array of the pipeline lay barge. The pipeline construction activities (including the use of anchors, chains, and wire ropes) must avoid these hard bottoms/pinnacles/PSBFs as depicted on the enclosed map(s) in the application by a distance of at least 100 ft (30 m). Include lay barge anchor position plats, at a scale of 1 in = 1,000 ft (305 m) with DGPS accuracy, with the pipeline construction report required by 30 CFR § 250.1008(b), which depict the "as-placed" location of all anchors, anchor chains, and wire ropes on the seafloor and which demonstrate that the features were not physically impacted by the construction activities. This mitigation may be applied by BSEE at the post-approval stage.
9.03	Hard Bottoms/Pinnacles/ Potentially Sensitive Biological Features (plans)	BOEM's analysis indicates that there are hard bottoms/pinnacles/PSBFs located in the vicinity of the activities proposed in the plan that likely provide habitat for biological assemblages. Any bottom-disturbing activities associated with the activities proposed in the plan must avoid these hard bottoms/pinnacles/PSBFs as depicted on the enclosed map(s) in the application by a distance of at least 100 ft (30 m). Submit to BSEE's Office of Field Operations at the same time you submit your End of Operations report (Form BSEE-0125) to the appropriate BSEE, Gulf of Mexico OCS Region, District Office an as-built map at a scale of 1 in = 1,000 ft with DGPS accuracy, showing the location of any seafloor disturbance (e.g., jack-up rig, barge anchors, etc.) relative to these features. This mitigation may be applied by BSEE at the post-approval stage.
9.04	Hard Bottoms/Pinnacles/ Potentially Sensitive Biological Features (DP lay barge) (pipeline applications)	BOEM's analysis indicates that there are hard bottoms/pinnacles/PSBFs that likely provide habitat for biological assemblages located on or near the proposed pipeline route. The pipeline construction activities must avoid these hard bottoms/pinnacles/PSBFs as depicted on the enclosed map(s) in the application by a distance of at least 100 ft (30 m).

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		This mitigation may be applied by BSEE at the post-approval stage.
9.05	Hard Bottoms/Pinnacles/ Potentially Sensitive Biological Features (structure removal)	BOEM's review of the application indicates that there are hard bottoms/pinnacles/PSBFs located in the vicinity of the activities proposed in the application that likely provide habitat for biological assemblages. Any bottom-disturbing activities associated with the activities proposed in the application must avoid these hard bottoms/pinnacles/PSBFs as depicted on the enclosed map(s) in the application by a distance of at least 100 ft (30 m). Include in the post-removal report the as-built plats, at a scale of 1 in = 1,000 ft with DGPS accuracy, which depict the "as-placed" location of all anchors, anchor chains, and wire ropes on the seafloor deployed during the structure removal relative to these features. This mitigation may be applied by BSEE at the post-approval stage.
9.10	ROV Survey Required Non-Recurring Mitigation	A non-recurring mitigation is a mitigating measure that is used for a unique, special, one-time-only mitigation that is added to certain plans.
Military Mitigations		
10.09	Naval Coastal Systems Center	Please be reminded that the lease stipulation requires the applicant to enter into an agreement with the Coastal Test and Evaluation Division, Coastal System Station/Code E21, Panama City, Florida 32407, concerning the control of your electromagnetic emissions and use of boats and aircraft in the Naval Coastal Systems Center Area.
11.11	Military Warning Area (all)	BOEM's review indicates that the proposed pipeline route and/or the routes to be taken by boats and aircraft in support of the proposed activities are located in or could traverse Military Warning Area W-(insert number) or Eglin Water Test Area EWTA-(insert number) (see BOEM's website at http://www.boem.gov/MWA-Boundaries/ for a map of the areas). Contact the appropriate individual military command headquarters (see BOEM's website at http://www.boem.gov/Military-Contacts-for-Warning-and-Water-Test-Areas/ for a list of the contacts) concerning the control of electromagnetic emissions and the use of boats and aircraft in this area(s) before commencing such traffic.
12.01	Unexploded Ordnance	The proposed operations are located in an area that was used until 1970 by the U.S. Department of Defense as an explosives dumping area. Please be advised that precautions should therefore be taken while conducting operations that involve any disturbance of the seafloor in order to avoid possible unexploded ordnance.
12.02	Naval Mine Warfare Area (MU 732, 733, and 734)	The proposed operations are located within a stipulated area designated by the Naval Mine Warfare Command for mine operations. Therefore, surface structures for exploration activities are subject to approval by BOEM's Gulf of Mexico OCS Region's Regional Director after consultation with the Commander, Mine Warfare Command. No permanent structures or debris of any kind will be allowed in the area during exploration operations.

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		Plans for any above seafloor development operations within the designated area must be coordinated with the Commander, Mine Warfare Command, 325 Fifth Street, SE, Corpus Christi, Texas 78491-5032.
	Shallow Drilling Hazards Mitigations (Plans)	
14.01	Shallow Gas and/or Water Flow	Exercise caution while drilling due to indications of shallow gas (and/or faulting) (and/or possible water flow).
14.02	Seafloor Instability	Exercise caution during drilling rig placement due to indications of seafloor instability.
14.03	Insufficient Information	Exercise caution during drilling rig placement due to insufficient information regarding seafloor foundation integrity.
	Shallow Hazards Mitigations	
15.01 and 15.02	Multiple Hazards (plans) Single Hazard (plans)	BOEM's review indicates that there are pipeline(s), unidentified magnetic anomaly(ies), unidentified side-scan sonar contact(s), or other specified hazard(s) in the vicinity of (insert name of platform(s) or well(s)) that may pose a hazard to the proposed operations. Therefore, take precautions in accordance with NTL 2008-G05, Section VI.B, prior to performing operations.
15.05 and 15.06	Multiple Hazards (plans/pipelines) (anchoring activities) Single Hazard (plans) (anchoring)	BOEM's review indicates that there is a pipeline(s), unidentified magnetic anomaly(ies), unidentified side-scan sonar contact(s), or other specified hazard(s) in the vicinity of (insert name of platform(s) or well(s)) that may pose a hazard due to anchoring activities associated with the proposed operations. If any of these activities will take place within 150 m (490 ft) of the potential hazard, take precautions in accordance with NTL 2008-G05, Section VI.B, prior to performing operations.
15.07	Pipeline Spanning	BOEM's review indicates areas of seafloor relief in the vicinity of the proposed pipeline route, which may cause spanning problems for the pipeline. Use an ROV in conjunction with the pipeline construction activities to ensure that these areas are avoided to the extent possible. Additionally, include a report with the pipeline construction report, which is required by 30 CFR § 250.1008(b) and which analyzes the as-laid pipeline with respect to spanning and describes the protective measures taken to ensure pipeline integrity for those portions of the pipeline where the areas of seafloor relief could not be avoided. This mitigation may be applied by BSEE at the post-approval stage.
15.08	Conflict with Anchors	Please be advised that exploration activities have been approved or are pending approval for (insert lease, block, area), which could potentially interfere with the proposed activities. Therefore, the applicant should contact (insert contact name, company, address, phone number) prior to commencement of the activities in order to avoid any potential conflicts.

Table B-1. Commonly Applied or “Standard” Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
	Topographic Features Mitigations	
16.00	Topographic Features Non-Recurring Mitigation	A non-recurring mitigation is a mitigating measure that is used for a unique, special, one-time-only mitigation that is added to certain plans.
16.01	Shunting All Wells (plans)	The proposed activities are within the “4-mile, 3-mile, 1-mile, or 1,000-meter zone” of (insert name of topographic feature). Shunt all drill cuttings and drilling fluids to the seafloor through a downpipe that terminates an appropriate distance, but no more than 10 m (33 ft), from the bottom.
16.02	Shunting Some Wells (plans)	Some of the proposed activities are within the “4-mile, 3-mile, 1-mile, or 1,000-meter zone” of (insert name of topographic feature). For (insert name of wells to be shunted”, shunt all drill cuttings and drilling fluids to the seafloor through a downpipe that terminates an appropriate distance, but no more than 10 m (33 ft), from the bottom.
16.03	No Activity Zone (right-of-way pipeline applications)	BOEM’s analysis indicates that the “no activity zone(s)” of the biologically sensitive feature(s) shown on the enclosed map(s) in the application may be located within the scope of the anchor array of the pipeline lay barge. Anchors, anchor chains, and wire ropes associated with the proposed pipeline construction activities must avoid this/these “no activity zone(s)” by a distance of at least 500 ft (152 m). Include lay barge anchor positions plats, at a scale of 1 in = 1,000 ft with DGPS accuracy, with the pipeline construction report required by 30 CFR § 250.1008(b), which depict the “as-placed” location of all anchors, anchor chains, and wire ropes on the seafloor, and which demonstrate that the “no activity zone(s)” was/were not physically impacted by the construction activities. This mitigation may be applied by BSEE at the post-approval stage.
16.04	No Activity Zone (plans)	Bottom-disturbing activities associated with the activities proposed in the plan must avoid the “no activity zone” of the biologically sensitive feature shown on the enclosed map in the application by a distance of at least 500 ft (152 m). Submit to BSEE’s Office of Field Operations, at the same time the End of Operations report (Form BSEE-0125) is submitted to the appropriate BSEE, Gulf of Mexico OCS Region, District Office, an as-built map at a scale of 1 in = 1,000 ft with DGPS accuracy, showing the location of any seafloor disturbance (e.g., jack-up rig placement, rig anchors, construction barge anchors, etc.) to demonstrate that the “no activity zone(s)” was not physically impacted. This mitigation may be applied by BSEE at the post-approval stage.
16.05	No Activity Zone (structure removal)	Bottom-disturbing activities associated with the activities proposed in the application must avoid the “no activity zone” of the biologically sensitive feature shown on the enclosed map in the application by a distance of at least 500 ft (152 m). Include in the post-removal

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		report an as-built plat, at a scale of 1 in = 1,000 ft with DGPS accuracy, depicting the "as-placed" location of all anchors, anchor chains, and wire ropes on the seafloor deployed during the structure-removal activities to show that the "no activity zone" was not physically impacted. This mitigation may be applied by BSEE at the post-approval stage.
Non-Plan and Pipeline Mitigations		
17.02	Fish (structure removals using explosives)	Under the Magnuson-Stevens Fisheries Conservation and Management Act, 50 CFR § 600.725 prohibits the use of explosives to take reef fish in the Exclusive Economic Zone. Consequently, those involved in explosive structure removals must not take such stunned or killed fish on board their vessels. Should this happen, they could be charged by the National Marine Fisheries Service (NMFS) with violation of the Act.
17.04	Site-Clearance Trawling Reporting	If trawling is used to comply with the site-clearance verification requirements under 30 CFR §§ 250.1740-1743, which mandates that turtle excluder devices (TED) be removed from the trawl nets to facilitate the collection of seabed debris, the applicant must abide by maximum trawl times of 30 minutes, allowing for the removal of any captured sea turtles. If, during trawling activities, the applicant captures a sea turtle in the nets, the applicant must (1) contact BSEE's Environmental Enforcement Branch and NMFS' Southeast Regional Office immediately, (2) resuscitate and release any captured sea turtles as per NMFS' guidelines found online at http://www.sefsc.noaa.gov/turtles/TM_NMFS_SEFSC_580_2010.pdf (refer to page 3-6, Plate 3-1), and (3) photograph the turtle and complete a sea turtle stranding form for each sea turtle caught in the nets. The form can be found at http://www.sefsc.noaa.gov/species/turtles/strandings.htm and submitted to NMFS and BSEE.
Conservation Information Document Mitigations		
18	Self-Burial Approval	BOEM hereby concurs with the determination that the subject pipeline will be installed in an area that is prone to self-burial. However, in the future, should it be determined that the pipeline(s) constitute(s) a hazard to navigation or commercial fishing operations or unduly interferes(s) with other uses of the OCS, the applicant will be required to bury it (them).
18.01	Conservation Information Document – Condition of Approval	Within 15 days after the proposed well is or wells are completed and logged, submit a revision to the plan consisting of the information required for a Conservation Information Document in accordance with NTL 2000-N05.
18.02	Conservation Information Document – Operations Approval	At the applicant's request, we are approving your development operation coordination document (DOCD) prior to the completion of our review of the accompanying Conservation Information Document (CID). However, please be advised that, if the CID review indicates that any of the proposed activities do not conform to sound conservation,

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		engineering, and economic practices as cited in 30 CFR §§ 550.202(a) and 550.1101(a), we will, in accordance with 30 CFR § 550.281(4)(b), require such revisions to the DOCD as are necessary to make the activities conform to such practices.
ROV Survey Mitigations		
19.01	ROV Survey Required – Exploration Plans (EP)	In accordance with NTL 2008-G06, the applicant must conduct the two ROV surveys proposed in the plan. The first survey will be for the first well location approved under this plan and which is actually drilled. The post-drilling survey can be conducted at the time the applicant is preparing to leave this location. The applicant must submit both survey reports within 60 days after the rig leaves the well location. This mitigation may be applied by BSEE at the post-approval stage.
19.02	ROV Survey Required – DOCD	In accordance with NTL 2008-G06, the applicant must conduct the ROV surveys proposed in the plan for the facility location approved under this plan. The applicant must submit the pre- and post-installation survey reports within 60 days after the facility installation is completed. This mitigation may be applied by BSEE at the post-approval stage.
19.03	ROV Survey Not Required	In accordance with NTL 2008-G06, BOEM has determined that the applicant will not need to conduct the two ROV surveys proposed in the plan. This mitigation may be applied by BSEE at the post-approval stage.
Surveys Mitigations		
21.01	Archaeology Assessment Not Acceptable	BOEM's review has determined that the archaeological analysis included in the survey report does not meet current BOEM requirements.
21.02	Archaeology Assessment Acceptable	BOEM's review has determined that the archaeological analysis included in the survey report meets current BOEM requirements.
21.03	Geophysical Review Acceptable	BOEM's review has determined that the subject survey report complies with the provisions of NTL 2008-G05 and, based on available data regarding any manmade hazards that may have been present at the time the survey was conducted, contains sufficient information to prepare an acceptable shallow hazards analysis for specific drilling or platform sites that the applicant may propose in future EPs or DOCDs. However, prior to submitting any such EPs or DOCDs, the applicant should update the accompanying anomaly map, if appropriate, to indicate the location of any manmade hazards (e.g., pipelines, abandoned wells, etc.) that did not exist at the time the survey was performed. Additionally, please be reminded that under the guidelines of NTL 2008-G04, the applicant should submit high-resolution survey data from the line closest to any proposed well or platform location, with one copy of each such EP or DOCD.

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
21.04	Geophysical Survey Report Not Acceptable	BOEM's review has also determined the subject survey report does not comply with the provisions of NTL 2008-G05.
21.05	3D Survey Waiver	Use of three-dimensional (3D) seismic data in lieu of high-resolution survey data as per NTL 2008-G05 is acceptable for the requested locations.
Pipeline Section Mitigations and Conditions		
22	Concrete Mats	The applicant's request to install protective concrete mats over the pipeline crossings in water less than 200 ft (61 m) deep is hereby approved pursuant to 30 CFR § 250.141.
25	Pipeline High-Pressure (PSH) Higher Than 15%	The applicant's request to set the PSH higher than 15 percent above the normal operating pressure range is hereby approved pursuant to 30 CFR § 250.142. The pipeline PSH shall be set no more than 5 percent above the latest shut-in tubing pressure of the well and will not be set above the maximum allowable operating pressure of the pipeline.
26	Denied Self-Burial	BOEM cannot concur with the applicant's determination that the subject pipeline will be installed in an area that is prone to self-burial. BOEM will only allow self-burial in areas with a soil strength that does not exceed 200 pounds per square foot. Therefore, the portions of the pipeline in water depths less than or equal to 200 ft (61 m) shall be buried.
28	Hydrostatic Head to Raise Maximum Allowable Operating Pressure	The applicant's request to determine the internal design pressure of the submerged portion of the pipeline by considering the effects of the external hydrostatic pressure, in lieu of using the standard formula outlined in 30 CFR § 250.1002(a), is hereby approved pursuant to 30 CFR § 250.141(a).
National Marine Fisheries Service Mitigations		
28.001	Species Protective Measures	The applicant must comply with the following species protective measures in all activities conducted pursuant to the plan: NTL 2016-BOEM-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting"; NTL 2012-JOINT-G02, "Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program"; and NTL 2012-BSEE-G01, "Marine Trash and Debris Awareness and Elimination." These measures are designed to promote environmental protection, consistent environmental policy, compliance with environmental laws, and safety.
29	Oil Spill Financial Responsibility (OSFR) Coverage	BOEM's review of the application indicates that, per 30 CFR §§ 553.3(1)-(3), the proposed right-of-way pipeline is classified as a covered offshore facility (COF) and requires oil-spill financial responsibility (OSFR) coverage. At this time, BSEE's records do not indicate that the required OSFR coverage is in place. The applicant is advised that they may begin construction of the proposed pipeline immediately. However, in accordance with 30 CFR § 553.15(b), the applicant may not begin operation of the pipeline until they have

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		submitted an application showing evidence of OSFR coverage and that demonstration has been approved by BSEE.
99	Department of Transportation Right-of-Way Pipeline	The applicant shall construct, operate, and maintain the pipeline in accordance with the appropriate U.S. Department of Transportation regulations.
110	Spanning Potential	There are several fault scarps along with the proposed pipeline route. Include with the construction report a listing of the location and length of any pipeline "spanning," resulting from laying the pipeline over these fault scarps. Also include a description of any remedial action necessary to minimize "spanning" and prevent pipeline damage. This mitigation may be applied by BSEE at the post-approval stage.
Office of Structural Technical Support Mitigations		
120.1	Reminder of NTL 2008-G05	If there are pipelines within the immediate proximity of the proposed platform site, precautions outlined in NTL 2008-G05, "Shallow Hazards Program," shall be taken while conducting operations.
120.15	Notify National Imagery and Mapping	In order to assure publication of onsite activity as it affects marine navigation safety, the applicant must notify the National Imagery and Mapping Agency in advance of commencement of platform installation.
120.2	Send Report to Office of Structural and Technical Support (OSTS)	Written notification shall be submitted to the Office of Structural and Technical Support (OSTS) and the Pipeline Section within 15 calendar days of completion of the platform installation operations, at which time the applicant will be provided with the "Complex Identification Number" (CPXID) that has been assigned to this structure. The CPXID should be included with other pertinent information (i.e., the right-of-way number, area code, block number, platform name, etc.) in all future correspondence related to this structure. Should significant problems occur during structure installation operations, please inform OSTS immediately. If for any reason the applicant decides not to install this structure, they shall submit a written cancellation letter.
120.7	Downhole Well Plugging	In accordance with 30 CFR § 250.1710, the applicant must downhole plug and abandon all wells on (insert area/block platform name) (except [insert well names]), no later than (insert date). However, the applicant will not be required to sever the casings, remove the wellhead, or clear the site until the right-of-use expires.
Geological and Geophysical Mitigations (deep-penetration applications) (no assigned mitigation numbers)		
Vessel-Strike Avoidance/Reporting		The applicant will follow the guidance provided under NTL 2016-BOEM-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting." The NTL 2016-

Table B-1. Commonly Applied or “Standard” Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		BOEM-G01 provides guidance on how a seismic operator should implement monitoring programs to minimize the risk of vessel strikes to protected species and should report observations of injured or dead protected species. In lieu of a formal observer program, this NTL provides specific guidelines that should be followed to identify and avoid injury to marine mammals and sea turtles.
	Seismic Survey Operation, Monitoring, and Reporting Guidelines	The applicant will follow the guidance provided under NTL 2012-JOINT-G02, “Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program.” Additionally, the applicant will comply with the guidance under this NTL when operating in all water depths (not just in water depths >200 m [656 ft] or in the Eastern Planning Area), and the NTL’s “shut-down conditions” will be applied towards manatees.
	Pre-Activity Sound-Source and Array Calibration Verification	Prior to conducting survey activities, the applicant will verify in writing that the proposed airgun arrays to be used are of the lowest sound intensity level that still achieves the survey goals. The written verification must include confirmation that the airgun array has been calibrated/tuned to maximize subsurface illumination and minimize, to the extent practicable, horizontal propagation of noise.
	Mandatory Separation Buffer between Survey Operations	The applicant will be required to maintain, to the extent it can practicably and safely do so, a minimum separation distance of 30 km (19 mi) from any other vessels concurrently conducting deep-penetration seismic surveys and 40 km (29 mi) when operating within an Area of Concern. To assist in implementation of this measure, BOEM will provide the applicant with contact information for all deep-penetration seismic applicants concurrently permitted/authorized to operate within or near the proposed survey area.
	Supplemental Reporting Requirements	In addition to the reporting requirements under NTL 2012-JOINT-G02, the applicant is required to submit bi-weekly reports containing the information listed below. The reporting periods end on the 1st and 15th of each month. These bi-weekly reports are required for the total duration of the permit. When applicable, the reports must be submitted with survey navigation data for the 2-week reporting period. BOEM has a suggested format for the written report. If BOEM’s suggested written format is not used, the following information must be submitted along with the navigation data: (1) the dates, locations, and duration of any deep-penetration seismic operations conducted during the reporting period (the navigation data provides this information); (2) any circumstances that caused the total energy output of the airgun source array to exceed that set forth in the permit application; (3) confirmation that the permittee maintained, to the extent they could practicably and safely do so, the minimum separation distance (If applicable, submit a written explanation of why the minimum separation distance was not maintained.); and (4) confirmation that the permittee complied with the other terms of Section V of the Settlement Agreement.

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
Military Warning Area Coordination		BOEM's review indicates that the routes to be taken by boats in support of the applicant's activities traversed Military Warning Areas W-92, W-147AB, and W-602. The applicant shall contact the appropriate individual military command headquarters concerning the control of electromagnetic emissions and use of boats in each of the areas before commencing the operations.
Marine Trash and Debris Awareness and Elimination		The applicant will follow the guidance provided under NTL 2012-BSEE-G01, "Marine Trash and Debris Awareness and Elimination." The NTL 2012-BSEE-G01 provides information on reducing, if not eliminating, trash intentionally jettisoned into the Gulf of Mexico. The programs described in the NTL to assist in the reduction of marine trash and debris are the marine trash and debris placards, marine trash and debris awareness training, and the marine trash and debris awareness training and certification process.
Geological and Geophysical Mitigation Natural Resource Defense Council Area of Concern (equal to or greater than 20-m [66-ft] water depth) (no assigned mitigation numbers)		
Seismic Survey Restriction Period		BOEM's review indicates that the proposed survey area falls within a portion of an unusual mortality event area declared/established by the National Marine Fisheries Service for cetaceans (whales and dolphins). The applicant shall adhere to a restriction period between March 1 and April 30 (primary bottlenose dolphin calving season) for deep penetration seismic surveys on the Federal OCS in coastal waters out to the 20-m (66-ft) isobath in the northern Gulf of Mexico to avoid potential impacts to dolphins in regards to behavioral disruptions to mother/calf bonding or masking of important acoustic cues. No airgun use, including the use of mitigation guns, is permitted during the restriction period.
Geological and Geophysical Mitigation Natural Resource Defense Council Area of Concern (equal to or greater than 100-m [328-ft] water depth) (no assigned mitigation numbers)		
Required Passive Acoustic Monitoring (PAM)		BOEM requires that the applicant use passive acoustic monitoring (PAM) in water depths of 100 m (328 ft) or greater at times of reduced visibility (darkness, rain, fog, etc.) as part of their protected species observer program. The PAM will be monitored at all times of reduced visibility. Applicants will be required to provide BSEE with a description of the passive acoustic system, the software used, and the monitoring plan prior to its use. Additionally, after survey completion, the applicant will provide an assessment of the usefulness, effectiveness, and problems encountered with the use of PAM for marine mammal detection to BSEE for review.

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
Mitigation for High-Resolution Surveys		
Vessel-Strike Avoidance/Reporting		The applicant will follow the guidance provided under NTL 2016-BOEM-G01, "Vessel Strike Avoidance and Injured/Dead Protected Species Reporting." The NTL 2016-BOEM-G01 provides guidance on how a seismic operator should implement monitoring programs to minimize the risk of vessel strikes to protected species and should report observations of injured or dead protected species. In lieu of a formal observer program, this NTL provides specific guidelines that should be followed to identify and avoid injury to marine mammals and sea turtles.
Marine Trash and Debris Awareness and Elimination		The applicant will follow the guidance provided under NTL 2012-BSEE-G01, "Marine Trash and Debris Awareness and Elimination." The NTL 2012-BSEE-G01 provides information on reducing, if not eliminating, trash intentionally jettisoned into the Gulf of Mexico. The programs described in the NTL to assist in the reduction of marine trash and debris are the marine trash and debris placards, marine trash and debris awareness training, and the marine trash and debris awareness training and certification process.
Geological and Geophysical Non-Recurring Mitigations		
Benthic Communities		Review of BOEM's 3D seismic database of water bottom anomalies identified both confirmed deepwater benthic communities and features that could potentially support communities within the area of the proposed activities. Based on BOEM's review of exploration activities proposed in the applicant's application, the following non-recurring mitigations are applied to the area encompassed by the plan: • BOEM's 3D seismic database of water bottom anomalies and confirmed communities shall be used to identify features for the purpose of applying this mitigation. • The following nine water bottom anomaly categories will be considered as supporting or potentially supporting deepwater benthic communities, unless proved otherwise through high- resolution surveys: anom_conf_coral; anom_conf_mvol; anom_conf_orgs; anom_poss_oil_pos; wb_anom_lith; wb_anom_mvol; wb_anom_neg; wb_anom_pock; and wb_anom_pos. • These shape files may be downloaded from http://www.boem.gov/Oil-and-Gas-Energy-Program/Mapping-and-Data/Map-Gallery/Seismic-Water-Bottom-Anomalies-Map-Gallery.aspx. • Features shall be either avoided or surveyed to confirm the presence or absence of deepwater benthic communities. • Per NTL 2009-G40, "Deepwater Benthic Communities," a minimum separation

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		of 250 ft (76 m) must be maintained between documented communities or features that could potentially support high-density deepwater benthic communities and bottom-disturbing activities (e.g., sensors deployed on the seafloor). – Therefore, a minimum distance of separation for planned sensor deployment sites from any feature or community documented in BOEM's water-bottom anomaly database must be at least 250 ft (76 m). – If at any time it is determined that a node has landed within 250 ft (76 m) of any feature or community documented in BOEM's water-bottom anomaly database, an ROV must be used to document the seafloor surrounding the landing location. The seafloor beneath the node and arms must be surveyed visually with an ROV for damages. All images collected during this survey, showing the area within the footprint of the node, must be returned to BOEM's Gulf of Mexico OCS Region, Biological Sciences Unit for evaluation. • As required by NTL 2009-G40, for bottom-disturbing activities occurring within 500 ft (152 m) of a high-density deepwater benthic community, the operator must provide BOEM with an as-placed plat showing the actual location of the disturbance on the seafloor, in relation to documented anomalies and communities. This requirement will apply to sensors placed within 500 ft (152 m) of a documented anomaly or community, as shown in BOEM's 3D seismic database. For sensor deployments requiring as-placed plats, prepare at a scale of 1 in = 1,000 ft and submit to BOEM's Regional Supervisor, Office of Resource Evaluation, Data Acquisition and Special Projects Unit.
Tethered Ocean Bottom Node Surveys		Acoustic buoy releases, tethered acoustic pingers, and nodal tethering lines pose an entanglement risk to sea turtles and other marine life. Implementing the following measures act to reduce the risk of entanglement and ensure proper reporting of entanglement situations. Reasonable measures are available to applicants using this deployment technique to reduce the risk of entanglement. These measures include the following: (1) shortening the acoustic buoy line and tethered acoustic pinger line to the shortest length practical; and (2) replacing tether rope lines equal to or greater than ¼-in diameter with a thicker, more rigid tether line, modifying the line by tying knots in the line to increase the diameter and rigidness in order to minimize the risk of entanglement. Additional measures include ensuring that a Protected Species Observer (PSO) is

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		onboard each vessel during tethered node retrieval operations. The PSOs will document any entanglement of marine species in the nodal gear, specifically noting the location where entanglement occurred (e.g., pinger tether, acoustic buoy line, etc.). If a marine protected species becomes entangled, specifically a sea turtle, the PSO will immediately begin resuscitation procedures as described in the National Oceanic and Atmospheric Administration's guidelines that can be found at http://www.st.nmfs.noaa.gov/Assets/Observer-Program/pdf/Shrimp_Reef_fish_Manual_9_22_10.pdf. The PSO must also contact the sea turtle stranding network's State coordinator to report the incident, condition of the turtle, and request additional instructions to reduce risk of injury or mortality, including rehabilitation and salvage techniques.
Topographic Features		The applicant must adhere to the provisions of the topographic features lease stipulation and the policy described in NTL 2009-G39, "Biologically-Sensitive Underwater Features and Areas," which restricts any bottom-disturbing activities within 152 m (500 ft) of the designated "No Activity Zone" of a topographic feature, as well as all applicable requirements described in the NTL.
Potential Archaeological Resource Protection		BOEM's review of the application indicates that numerous targets identified by existing remote-sensing data are located in the project area where the ocean bottom cables (OBCs) are proposed to be deployed. Therefore, in order to demonstrate compliance with 30 CFR § 551.6(a)(5), the applicant will either (1) ensure that all seafloor-disturbing actions required for the OBC deployment avoid the features by a distance greater than that listed in the tables or (2) conduct an underwater archaeological investigation prior to cable deployment to determine whether the feature represents an archaeological resource. If the applicant chooses to avoid the feature, they will be required to submit a plat, at a scale of 1 in = 1000 ft with DGPS accuracy, with their final report as required by 30 CFR § 551.8(c)(2), which demonstrates the feature was not physically impacted by the OBC deployment and retrieval or by any other associated bottom disturbances. If the applicant chooses to conduct an underwater archaeological investigation, they will be required to comply with the investigation methodology and reporting guidelines found on BOEM's website at http://www.boem.gov/gom-archaeology/. This is only a partial list of potential archaeological sites within the project area, based on existing remote-sensing data. There are significant portions of the project area within the OCS that have received either limited or no previous archaeological survey, and these areas are likely to contain additional archaeological materials that may be impacted by the proposed operations. If the applicant discovers additional manmade debris that appears

Table B-1. Commonly Applied or "Standard" Mitigating Measures (continued).

Mitigation Number	Mitigating Measure Title	Description of Mitigation
		to indicate the presence of a shipwreck (e.g., a sonar image or visual confirmation of an iron, steel, or wooden hull; wooden timbers; anchors; concentrations of manmade objects such as bottles or ceramics; and piles of ballast rock) within or adjacent to the proposed action area during the proposed survey operations, the applicant will be required to immediately halt operations, take steps to ensure that the site is not disturbed in any way, and contact BOEM's Regional Supervisor, Office of Environment within 48 hours of its discovery. The applicant must cease all operations within 1,000 ft (305 m) of the site until BOEM's Regional Director instructs the applicant on what steps must be taken to assess the site's potential historic significance and what steps the applicant must take to protect it. If an OBC becomes snagged on any submerged object, divers are required to un-snag and retrieve the OBC, and the applicant must submit a report detailing each instance of this activity. This report should include the coordinates of the snag (to DGPS accuracy), the diver's description of the submerged object creating the snag, any damage that may have resulted from the OBC placement or retrieval operations, and any photographic or video imagery that is collected. The applicant must submit a report of any data collected as a result of these investigations.

APPENDIX C

COOPERATING AGENCY MEMORANDUM OF AGREEMENT

C COOPERATING AGENCY MEMORANDUM OF AGREEMENT

MEMORANDUM OF AGREEMENT BETWEEN THE BUREAU OF OCEAN ENERGY MANAGEMENT GULF OF MEXICO OCS REGION AND THE U.S. ENVIRONMENTAL PROTECTION AGENCY REGIONS 4 AND 6 DURING COMPLETION OF THE MULTISALE ENVIRONMENTAL IMPACT STATEMENT FOR 2017-2022 PROPOSED OIL AND GAS LEASE SALES IN THE GULF OF MEXICO OUTER CONTINENTAL SHELF

INTRODUCTION

The Bureau of Ocean Energy Management (BOEM) is preparing an Environmental Impact Statement (EIS) to identify the environmental and human effects for the 2017-2022 Gulf of Mexico Outer Continental Shelf (OCS) proposed oil and gas lease sales. On April 4, 2015, a Notice of Intent to prepare this EIS was published in the *Federal Register* for initial scoping and identification of scheduled scoping meetings.

The Council on Environmental Quality's regulations at 40 CFR § 1501.6 emphasize agency cooperation in the National Environmental Policy Act (NEPA) process between Federal agencies either having overlapping jurisdiction or special expertise related to a proposed action. The U.S. Environmental Protection Agency (USEPA) requested to be a cooperating agency on this EIS and BOEM has agreed to accept their request.

This Memorandum of Agreement (MOA) outlines the responsibilities of BOEM and USEPA for this EIS. It is designed to establish expectations between the two agencies that apply for the duration of the 2017-2022 Gulf of Mexico Multisale EIS, whereupon it terminates upon publication of the Final EIS or upon written notice of termination as provided below. Executing this MOA does not affect USEPA's independent review and comment responsibilities under Section 309 of the Clean Air Act or its responsibilities under any other statutory or regulatory authorities. This MOA does not affect BOEM's responsibilities under the Outer Continental Shelf Lands Act, regulations under 30 CFR Part 550, or any other statutory or regulatory authorities.

BOEM RESPONSIBILITIES

(1) BOEM will designate a primary point of contact (POC) for matters related to this MOA. At the present time, Helen Rucker is the POC for the Gulf of Mexico OCS Region. BOEM will notify USEPA if the POC changes during the period of time this MOA is in effect.

(2) BOEM will provide an EIS preparation schedule for all solicited inputs and review periods, including administrative reviews.

(3) BOEM will set up and hold public meetings for the Draft EIS.

(4) BOEM will provide USEPA a copy and summary of pertinent comments received during preparation of this EIS (including scoping and the Draft EIS public comment period).

(5) BOEM will publish a copy of this MOA as an appendix to this EIS.

(6) BOEM will provide briefings to USEPA staff on the Draft EIS scope, analyses, and conclusions, as arranged between the BOEM and USEPA POCs.

(7) BOEM will provide USEPA with preliminary responses to USEPA and public comments on the Draft EIS, and relevant draft sections of the Final EIS for review prior to final lead agency approval and distribution of the document.

USEPA RESPONSIBILITIES

(1) USEPA Region 4 and Region 6 will designate a primary POC to represent USEPA in matters related to this MOA. At the present time, the USEPA's POC for Region 4 is Dan Holliman and the POC for Region 6 is Jerry Saunders. The USEPA will notify BOEM if either POC changes during the period of time this MOA is in effect.

(2) USEPA will provide all available information in which USEPA has expertise, as applicable.

(3) USEPA will comply with BOEM's EIS preparation schedule for all solicited inputs and review periods, including administrative reviews.

(4) USEPA will be responsible for any expenses incurred by USEPA related to this MOA.

TERMINATION

This MOA may be terminated by written notice by either of the below signatories or their successor at any time. This MOA terminates with publication of the Final 2017-2022 Gulf of Mexico Multisale EIS.

LIMITATIONS

All commitments made in this MOA are subject to the availability of appropriated funds and each agency's budget priorities. Nothing in this MOA obligates BOEM or USEPA to expend appropriations or to enter into any contract, assistance agreement, or interagency agreement, or to incur other financial obligations. This MOA is neither a fiscal nor a funds obligation document. Any endeavor involving reimbursement or contribution of funds between the parties to this MOA will be handled in accordance with applicable laws, regulations, and procedures, and will be subject to separate subsidiary agreements that will be effected in writing by representatives of both parties. This MOA does not create any right or benefit enforceable against BOEM or USEPA, their officers or employees, or any other person. This MOA does not apply to any person outside BOEM and USEPA.

RESOLUTION OF DISPUTES

The parties agree to make every attempt to settle any disputes arising under this MOA at the lowest operational level. In the case of a substantial disagreement between BOEM and USEPA, each agency will designate a senior management official at the regional level to seek resolution. If these officials do not resolve the dispute within 30 days, the agencies will further elevate the matter to the Gulf of Mexico Regional Director of BOEM and the Region 6 Compliance Assurance and Enforcement Division Director and Director, Resource Conservation and Restoration Division, Region 4 USEPA for prompt resolution.

NOTICES

Except as otherwise provided herein, all notices relating to this MOA must be provided to the following:

To BOEM: Helen Rucker
1201 Elmwood Park Blvd
New Orleans, Louisiana 70123
Helen.Rucker@boem.gov
504-736-2421

To USEPA Region 4: Dan Holliman
61 Forsyth Street SW
Atlanta, Georgia 30303
Holliman.daniel@epa.gov
404-562-9531

To USEPA Region 6: Jerry Saunders
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733
Saunders.jerry@Epa.gov
214-665-6470

PREDECISIONAL MATERIALS

The undersigned hereby agree to maintain the confidentiality of pre-decisional information and documents shared in furtherance of this MOA during completion of this EIS consistent with the Freedom of Information Act (FOIA) and other applicable statutes. This agreement to maintain confidentiality of information and documents applies to all pre-decisional documents and communications, including, but not limited to, the following: email messages; notes to the file; agendas, pre-meeting materials, presentations, meeting notes and summaries; letters; review evaluations; drafts of documents; and all documents created and shared as part of the collaboration established in this MOA. Any information that is required to be released to the public due to Agency legal obligations should not contain confidential or privileged information, including deliberative process privilege materials related to preparation of the Draft and Final EISs. Upon receipt of a Freedom of Information Act request requesting information related to the activities carried out under this MOA, each agency will coordinate with or refer the request to the agency who generated the information prior to releasing the information to the requester.

* * *

This MOA may be executed in counterparts, each of which will be deemed to be an original. The signatures on this MOA may be executed on separate pages and all of which together will constitute one and the same agreement.

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

3/14/16
Date

John Blevins
Director
Compliance Assurance and Enforcement Division
USEPA Region 6

2·23·/6
Date

G. Alan Farmer
Director
Resource Conservation and Restoration Division
USEPA Region 4

1/7/16
Date

APPENDIX D

PROPOSED LEASE MITIGATING MEASURES (STIPULATIONS)

D PROPOSED LEASE MITIGATING MEASURES (STIPULATIONS)

The potential lease stipulations and mitigating measures included for analysis in this Multisale EIS were developed as a result of numerous scoping efforts for the continuing OCS Program in the Gulf of Mexico. The Topographic Features and Live Bottom (Pinnacle Trend) Stipulations have been applied as programmatic mitigation in the 2017-2022 Five-Year Program EIS (USDOI, BOEM, 2016B) and therefore, would apply to all leases issued under the 2017-2022 Oil and Gas Program in designated lease blocks. The other 8 lease stipulations described below would be considered for each proposed lease sale, as applicable. These measures will be considered for adoption by the Assistant Secretary for Land and Minerals Management (ASLM), under authority delegated by the Secretary of the Interior. The analysis of any stipulations for any particular alternative 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 in the Record of Decision for that lease sale. Mitigating measures in the form of lease stipulations are added to the lease terms and are therefore enforceable as part of the lease. In addition, each exploration and development plan, as well as any pipeline applications that result from a lease sale, will undergo a NEPA review, and additional project-specific mitigations applied as conditions of plan approval at the postlease stage. The BSEE has the authority to monitor and enforce these conditions, and under 30 CFR part 250 Subpart N, may seek remedies and penalties from any operator that fails to comply with those conditions, stipulations, and mitigating measures.

D.1 TOPOGRAPHIC FEATURES STIPULATION

The topographic features located in the WPA and CPA provide habitat for coral-reef-community organisms (**Chapter 4.6.1**). There are currently no identified topographic features protected under this stipulation in the EPA. Oil- and gas-related activities resulting from a proposed action could have a severe, even lethal, impact on or near these communities if the Topographic Features Stipulation was not adopted and such activities were not otherwise mitigated. The DOI has recognized this problem for some years, and since 1973 stipulations have been made a part of leases on or near these biotic communities; impacts from nearby oil- and gas-related activities were mitigated to the greatest extent possible. This stipulation does not prevent the recovery of oil and gas resources but would serve to protect valuable and sensitive biological resources.

The Topographic Features Stipulation was formulated based on consultation with various Federal agencies and comments solicited from the States, industry, environmental organizations, and academic representatives. The stipulation is based on years of scientific information collected since the inception of the stipulation. This information includes various Bureau of Land Management/MMS (BOEM)-funded studies of topographic highs in the GOM; numerous stipulation-imposed, industry-funded monitoring reports; and the National Research Council's (NRC) report entitled *Drilling Discharges in the Marine Environment* (1983). The blocks affected by the Topographic Features Stipulation are shown in **Figure 2-4**.

The requirements in the stipulation are based on the following facts:

(1) Shunting of the drilling effluent to the nepheloid layer confines the effluent to a level deeper than that of the living components of a high-relief topographic feature. Shunting is therefore an effective measure for protecting the biota of high-relief topographic features (Bright and Rezak, 1978; Rezak and Bright, 1981; NRC, 1983).

(2) The biological impact on the benthos from the deposition of nonshunted discharge is mostly limited to within 1,000 m (3,281 ft) of the discharge (NRC, 1983).

(3) The biota of topographic features can be categorized into depth-related zones defined by degree of reef-building activity (Rezak and Bright, 1981; Rezak et al., 1983 and 1985).

The stipulation establishes No Activity Zones at the topographic features. A zone is defined by the 85-m (279-ft) bathymetric contour (isobath) because, generally, the biota shallower than 85 m (279 ft) are more typical of the Caribbean reef biota, while the biota deeper than 85 m (279 ft) are similar to soft bottom organisms found throughout the GOM. Where a bank is in water depths less than 85 m (279 ft), the deepest "closing" isobath defines the No Activity Zone for that topographic feature. Within the No Activity Zones, no operations, anchoring, or structures are allowed. Outside the No Activity Zones, additional restrictive zones are established where oil and gas operations could occur, but where drilling discharges would be shunted.

The stipulation requires that all effluents within the area shown as the "1,000-Meter Zone" on the Topographic Features Stipulation Map (found on BOEM's website at http://www.gomr.mms.gov/homepg/lsesale/topo_features_package.pdf) be shunted to within 10 m (33 ft) of the seafloor. Banks containing the more sensitive and productive algal-sponge zone require a shunt zone extending 1 nmi (1.2 mi; 1.9 km) and an additional 3-nmi (3.5-mi; 5.6-km) shunt zone for development only.

Exceptions to the general stipulation are made for the Flower Garden Banks and the low-relief banks. Because the East and West features of the Flower Garden Banks have received National Marine Sanctuary status, they are protected to a greater degree than the other banks. The added provisions at the Flower Garden Banks National Marine Sanctuary (i.e., the boundary as of the publication of this Multisale EIS) require that (a) the No Activity Zone be based on the 100-m (328-ft) isobath instead of the 85-m (279-ft) isobath and be defined by the "1/4 1/4 1/4" system (a method of defining a specific portion of a block) rather than the actual isobath and (b) there be a 4-Mile Zone instead of a 1-Mile Zone in which shunting is required. Although Stetson Bank (a high-relief feature) was made part of the Flower Garden Banks National Marine Sanctuary in 1996, it has not as yet received added protection that would differ from current stipulation requirements.

Low-relief banks have only a No Activity Zone. A shunting requirement would be counterproductive because it would put the potentially toxic drilling muds in the same water depth range as the features associated biota that are being protected. Also, the turbidity potentially caused by the release of drilling effluents in the upper part of the water column would not affect the biota on low-relief features as they appear to be adapted to high turbidity. Claypile Bank, which is a low-relief bank that exhibits the *Millepora*-sponge community, has been given the higher priority protection of a 1,000-Meter Zone where monitoring is required.

The stipulation reads as follows:

Topographic Features Stipulation

(a) No activity including placement of structures, drilling rigs, pipelines, or anchoring will be allowed within the listed isobath ("No Activity Zone") of the leases on banks as listed below.

(b) Operations within the "1,000-Meter Zone" shall be restricted by shunting all drill cuttings and drilling fluids to the bottom through a structurally sound downpipe that terminates at an appropriate distance, but no more than 10 m, from the bottom.

(c) Operations within a "1-Mile Zone" must be restricted by shunting all drill cuttings and drilling fluids to the bottom through a structurally sound downpipe that terminates at an appropriate distance, but no more than 10 m, from the bottom. (Where there is a "1-Mile Zone" designated, the "1,000-Meter Zone" in paragraph (b) is not designated.) This restriction on operations also applies to areas surrounding the Flower Garden Banks National Marine Sanctuary (i.e., the boundary as of the publication of this Multisale EIS), namely the "4-Mile Zone" surrounding the East Flower Garden Bank and the West Flower Garden Bank.

(d) Operations within a "3-Mile Zone" must be restricted by shunting all drill cuttings and drilling fluids from development operations to the bottom through a structurally sound downpipe that terminates at an appropriate distance, but no more than 10 m, from the bottom. If more than two exploration wells that are for purposes other than development operations are to be drilled from the same surface location, all drill cuttings and drilling fluids must be restricted by shunting to the bottom through a structurally sound downpipe that terminates at an appropriate distance, but no more than 10 meters, from the bottom.

The Topographic Features Stipulation, together with the appropriate Topographic Features Stipulation Map, may be included in leases issued as a result of a lease sale on blocks within the areas so indicated in the Western and Central Gulf of Mexico Topographic Features Stipulation Map Package, which is available from the BOEM's Gulf of Mexico OCS Region's Public Information Office at 1-800-200-GULF and on BOEM's website at http://www.boem.gov/Topo-Stip-Map-

Package/. As referenced in paragraphs (a)-(d) of this stipulation, a Topographic Features Stipulation Map will be attached to each lease instrument subject to this stipulation.

The banks and corresponding blocks to which this stipulation may be applied in the WPA are as follows:

Shelf Edge Banks		Low-Relief Banks[2]		South Texas Banks[4]	
Bank Name	Isobath (m)	Bank Name	Isobath (m)	Bank Name	Isobath (m)
West Flower Garden Bank (defined by ¼ ¼ ¼ system)	100	Mysterious Bank	74, 76, 78, 80, 84	Dream Bank	78, 82
		Coffee Lump	Various	Southern Bank	80
East Flower Garden Bank (defined by ¼ ¼ ¼ system)	100	Blackfish Ridge	70	Hospital Bank	70
		Big Dunn Bar	65	North Hospital Bank	68
MacNeil Bank	82	Small Dunn Bar	65	Aransas Bank	70
29 Fathom Bank	64	32 Fathom Bank	52	South Baker Bank	70
Rankin Bank	85	Claypile Bank[3]	50	Baker Bank	70
Bright Bank[1]	85				
Stetson Bank	52				
Appelbaum Bank	85				

[1] CPA bank with a portion of its "3-Mile Zone" in the WPA.
[2] Low-Relief Banks—only paragraph (a) of the stipulation applies.
[3] Claypile Bank—only paragraphs (a) and (b) of the stipulation apply. In paragraph (b), monitoring of the effluent to determine the impact on the biota of Claypile Bank shall be required rather than shunting.
[4] South Texas Banks—only paragraphs (a) and (b) of the stipulation apply.

The banks and corresponding blocks to which this stipulation may be applied in the CPA are as follows:

Bank Name	Isobath (m)	Bank Name	Isobath (m)
McGrail Bank	85	Jakkula Bank	85
Bouma Bank	85	Sweet Bank[1]	85
Rezak Bank	85	Bright Bank[3]	85
Sidner Bank	85	Geyer Bank	85
Sackett Bank[2]	85	Elvers Bank	85
Ewing Bank	85	Alderdice Bank	80
Diaphus Bank[2]	85	Fishnet Bank[2]	76
Parker Bank	85	Sonnier Bank	55

[1] Only paragraph (a) of the stipulation applies.
[2] Only paragraphs (a) and (b) of the stipulation apply.
[3] CPA bank with a portion of its “3-Mile Zone” in the WPA.

Effectiveness of the Lease Stipulation

The purpose of the stipulation is to protect the biota of the topographic features from adverse impacts due to routine oil and gas activities. Such impacts include physical damage from anchoring and rig emplacement and potential toxic and smothering impacts from muds and cuttings discharges. The Topographic Features Stipulation has been used on leases since 1973, and this experience shows that the stipulation effectively prevents damage to the biota of these banks from routine oil and gas activities. Anchoring related to oil- and gas-related activities on the sensitive portions of the topographic features has been prevented. Monitoring studies have demonstrated that the shunting requirements of the stipulations are effective in preventing the muds and cuttings from impacting the biota of the banks. The stipulation, if adopted for a proposed action, will continue to protect the biota of the banks, specifically as discussed below.

Mechanical damage resulting from oil- and gas-related operations is probably the single most serious impact to benthic habitat. Complying with the No Activity Zone designation of the Topographic Features Stipulation should completely eliminate this threat to the sensitive biota of WPA and CPA topographic features from activities resulting from a proposed action. The sensitive biota within the zones provided for in the Topographic Features Stipulation will thus be protected.

Several other impact-producing factors may threaten communities associated with topographic features. Vessel anchoring and structure emplacement result in physical disturbance of benthic habitat and are the most likely activities to cause permanent or long-lasting impacts to sensitive offshore habitats. Recovery from damage caused by such activities may take 10 or more years (depending on the maturity of the impacted community). Operational discharges (drilling muds and cuttings, produced waters) may impact the biota of the banks due to turbidity and sedimentation, resulting in death to benthic organisms in large areas. Recovery from such damage may take 10 or more years (depending on the maturity of the impacted community). A loss of well control without the release of substantial amounts of oil could cause similar damage to benthic biota by resuspending sediments, causing turbidity and sedimentation, which could ultimately have a lethal impact on benthic organisms. Recovery from such damage may take up to 10 years (depending on the maturity of the impacted community). Oil spills will cause damage to benthic organisms if the oil contacts the organisms; such contact is unlikely except from spills related to blowouts. There have been few blowouts in the GOM. Structure removal using explosives can result in water turbidity, redeposition of sediments, and explosive shock-wave impacts. Recovery from such damage could take more than 10 years (depending on the maturity of the impacted community). The above activities, especially bottom-disturbing activities, have the greatest potential to severely impact the biota of topographic features. A proposed action, without the Topographic Features Stipulation or comparable mitigation, is expected to have a severe impact on the sensitive offshore habitats of the topographic features.

The stipulation provides different levels of protection for banks in different categories as defined by Rezak and Bright (1981). The categories and their definitions are as follows:

Category A: zone of major reef-building activity; maximum environmental protection recommended;

Category B: zone of minor reef-building activity; environmental protection strongly recommended;

Category C: zone of negligible reef-building activity, but crustose algae present; environmental protection recommended; and

Category D: zone of no reef-building and insignificant populations of crustose algae; additional protection not necessary.

The stipulation requires that all effluents within 1,000 m (3,281 ft) of Sackett, Fishnet, and Diaphus Banks, categorized by Rezak and Bright (1981) as Category C banks, be shunted into the nepheloid layer; the potentially harmful materials in drilling muds will be trapped in the bottom boundary layer and will not move up the banks where the biota of concern are located. Surface drilling discharge at distances greater than 1,000 m (3,281 ft) from the bank is not expected to impact the biota.

The stipulation protects the remaining banks (Category A and B banks) with even greater restrictions. Surface discharge will not be allowed within 1 nmi (1.2 mi; 1.9 km) of these more sensitive banks. Surface discharges outside of 1 nmi (1.2 mi; 1.9 km) are not expected to impact the biota of the banks, as adverse impacts from surface discharge are limited to 1,000 m (3,281 ft). However, it is possible that, when multiple wells are drilled from a single platform (surface location), typical during development operations, extremely small amounts of muds discharged more than

1 nmi (1.2 mi; 1.9 km) from the bank may reach the bank. In order to eliminate the possible cumulative impact of muds discharged during development drilling, the stipulation imposes a 3-Mile Zone within which shunting of development well effluent is required.

The stipulation would prevent damage to the biota of the banks from routine oil- and gas-related activities resulting from a proposed action, while allowing the development of nearby oil and gas resources. The stipulation will not protect the banks from the adverse impacts of an accident such as a large blowout on a nearby oil or gas operation.

D.2 LIVE BOTTOM (PINNACLE TREND) STIPULATION

The Live Bottom (Pinnacle Trend) Stipulation is intended to protect live bottoms and the associated hard bottom communities from damage and, at the same time, provide for recovery of potential oil and gas resources. This stipulation has been routinely applied to appropriate CPA oil and gas lease sales since 1974, to protect known pinnacle trend features.

The Live Bottom (Pinnacle Trend) Stipulation covers the pinnacle trend area of the CPA (**Figure 2-4**). A small portion of the northeastern proposed CPA lease sale area is characterized by a pinnacle trend, which is classified as a live bottom under the stipulation. The pinnacles are a series of topographic irregularities with variable biotal coverage, which provide structural habitat for a variety of pelagic fish. The pinnacles trend features in the region could be impacted from physical damage of unrestricted OCS oil- and gas-related activities, as noted in **Chapter 4.6.2**. More detail on the Live Bottom (Pinnacle Trend) Stipulation and the affected blocks can be found at http://www.boem.gov/Biologically-Sensitive-Areas-List/.

The stipulation reads as follows:

Live Bottom (Pinnacle Trend) Stipulation

For the purpose of this stipulation, "live bottom areas" are defined as seagrass communities; or those areas which contain biological assemblages consisting of such sessile invertebrates as sea fans, sea whips, hydroids, anemones, ascidians, sponges, bryozoans, or corals living upon and attached to naturally occurring hard or rocky formations with rough, broken, or smooth topography; or areas whose lithotope favors the accumulation of turtles, fishes, and other fauna.

Prior to any drilling activities or the construction or placement of any structure for exploration or development on this lease, including, but not limited to, anchoring, well drilling, and pipeline and platform placement, the lessee will submit to the BOEM Regional Director (RD) a live bottom survey report containing a bathymetry map prepared utilizing remote-sensing data and an interpretation of live bottom areas prepared from the data collected. The resultant bathymetry map shall be prepared for the purpose of determining the presence or absence of live bottoms which could be impacted by the proposed activity. This map shall encompass such an area of the seafloor where surface disturbing activities, including anchoring, may occur.

If the BOEM Regional Director determines that live bottoms might be adversely impacted by the proposed activity, the RD will require the lessee to undertake any measure deemed economically, environmentally, and technically feasible to protect the live bottom area. These measures may include, but are not limited to, relocation of operations, shunting of fluids and cuttings, and monitoring to assess the impact of the activity on the live bottoms.

NOTE: In the past, a similar stipulation known as the Live Bottom (Low-Relief) Stipulation was applied to appropriate oil and gas lease sales since 1982 to protect known low-relief features. All EPA blocks in water depths of 100 m (328 ft) or less and the following CPA blocks have known live bottom (low-relief) features and would be subject to the stipulation: Pensacola Blocks 751-754, 793-798, 837-842, 881-886, 925-930, and 969-975; and Destin Dome Blocks 1-7, 45-51, 89-96, 133-140, 177-184, 221-228, 265-273, 309-317, 353-361, 397-405, 441-448, 485-491, 529-534, and 573-576. However, these blocks are located in areas currently under moratorium and are not a part of a proposed action for this Multisale EIS. While none of the blocks with known concentrations of live bottom low-relief habitat are expected to be offered for lease, several live bottom low-relief areas are adjacent to blocks that would be offered for lease under a proposed action and could potentially be affected by impacts of routine activities and accidental events. If, however, any low-relief features are identified during NEPA reviews of site-specific development plans, then the protective measures outlined in NTL 2009-G39 would be applied to prevent impacts. More detail on the Live Bottom (Low-Relief) Stipulation and the affected blocks can be found in NTL 2009-G39 and online at http://www.boem.gov/Biologically-Sensitive-Areas-List/.

Effectiveness of the Lease Stipulation

Through detection and avoidance, this stipulation minimizes the likelihood of mechanical damage from OCS oil- and gas-related activities associated with rig and anchor emplacement to the sessile and pelagic communities associated with the crest and flanks of such features. Since this area is subject to heavy natural sedimentation, this stipulation does not include any specific measures to protect the live bottoms from the discharge of effluents.

The sessile and pelagic communities associated with the crest and flanks of the live bottom features could be adversely impacted by oil- and gas-related activities resulting from a proposed action if such activities took place on or near these communities without the Live Bottom Stipulation. For many years, this stipulation has been made a part of leases on blocks in the CPA to ensure that pinnacle trend areas are mitigated to the greatest extent possible from nearby OCS oil- and gas-related activities. This stipulation does not prevent the recovery of oil and gas resources; however, it does serve to protect valuable and sensitive biological resources.

Activities resulting from a proposed action, particularly anchor damage to localized live bottom areas, would be expected to cause substantial damage to portions of these areas because these activities are potentially destructive to the biological communities and could damage one or several individual live bottom areas. The most potentially damaging of these are the impacts associated with mechanical damages that may result from anchors. However, the action is judged to be infrequent because of the limited operations in the vicinity of live bottoms and the small size of many of the features. Minor impact is expected from large oil spills, losses of well control, pipeline emplacement, muds and cuttings discharges, and structure removals. A proposed action, without the benefit of the Live Bottom Stipulation, could have an adverse impact on these areas, but such impact is expected to be localized in nature. Impact from mechanical damage, including anchors, could potentially be long term if the physical integrity of the live bottoms themselves became altered.

The pinnacle trend occurs as patchy regions within the general area of the eastern portion of the CPA (Ludwick and Walton, 1957; Barry A. Vittor and Associates, Inc., 1985; Brooks and Giammona, 1990). The pinnacle trend also extends into the EPA but not in the portion of the EPA proposed or available for leasing. The stipulation would require the operators to locate the individual pinnacles and associated communities that may be present in the block. Outside of the pinnacle trend, live bottom low-relief features can and do occur in isolated locations in shallow waters (<984 ft; 300 m) throughout the GOM wherever there is suitable hard substrate and other physical conditions (e.g., depth, turbidity, etc.) that allow for epibenthic community development (Rezak et al., 1990). However, they are primarily known to be present in some locations on the Mississippi-Alabama Shelf and in many more locations on the West Florida Shelf (**Figure 4-17**), which is far east of the proposed EPA lease sale area. The stipulation requires that a survey be done to encompass the potential area of proposed surface disturbance and that a bathymetry map depicting any live bottoms in the vicinity be prepared from the survey. BOEM's Regional Director, through consultation with FWS, could then decide if live bottom features would be potentially impacted and, if so, require appropriate mitigating measures.

By identifying the live bottom features present at the activity site, the lessee would be directed to avoid placement of the drilling rig and anchors on the sensitive areas. Thus, mechanical damage to the live bottom features is eliminated when measures required by the stipulation are imposed. The rapid dilution of drill cuttings and muds will minimize the potential of significant concentration of effluents on live bottom features; therefore, the stipulation does not address effluent discharges.

D.3 Military Areas Stipulation

The Military Areas Stipulation has been applied to all blocks leased in military areas since 1977 and reduces potential space-use conflicts, 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 2-7** shows the military warning areas in the Gulf of Mexico. As referenced in paragraph (a) of the stipulation, a list of the appropriate command headquarters will be included with each lease package subject to this stipulation.

Military Areas Stipulation

(a) Hold and Save Harmless

Whether compensation for such damage or injury might be due under a theory of strict or absolute liability or otherwise, the lessee assumes all risks of damage or injury to persons or property, which occur in, on, or above the OCS, to any persons or to any property of any person or persons who are agents, employees, or invitees of the lessee, its agents, independent contractors, or subcontractors doing business with the lessee in connection with any activities being performed by the lessee in, on, or above the OCS, if such injury or damage to such person or property occurs by reason of the activities of any agency of the United States (U.S.) Government, its contractors or subcontractors, or any of its officers, agents or employees, being conducted as a part of, or in connection with, the programs and activities of the command headquarters listed at the end of this stipulation.

Notwithstanding any limitation of the lessee's liability in Section 14 of the lease, the lessee assumes this risk whether such injury or damage is caused in whole or in part by any act or omission, regardless of negligence or fault, of the U.S. Government, its contractors or subcontractors, or any of its officers, agents, or employees. The lessee further agrees to indemnify and save harmless the U.S. Government against all claims for loss, damage, or injury sustained by the lessee, or to indemnify and save harmless the U.S. Government against all claims for loss, damage, or injury sustained by the agents, employees, or invitees of the lessee, its agents, or any independent contractors or subcontractors doing business with the lessee in connection with the programs and activities of the aforementioned military installation, whether the same be caused in whole or in part by the negligence or fault of the U.S. Government, its contractors, or subcontractors, or any of its officers, agents, or employees and whether such claims might be sustained under a theory of strict or absolute liability or otherwise.

(b) Electromagnetic Emissions

The lessee agrees to control its own electromagnetic emissions and those of its agents, employees, invitees, independent contractors or subcontractors emanating from individual designated defense warning areas in accordance with requirements specified by the commander, or his/her designee, of the command headquarters to the degree necessary to prevent damage to, or unacceptable interference with, Department of Defense flight, testing, or operational activities, conducted within individual designated warning areas. Necessary monitoring control, and coordination with the lessee, its agents, employees, invitees, independent contractors or subcontractors, will be affected by the commander of the appropriate onshore military installation conducting operations in the particular warning area; provided, however, that control of such electromagnetic emissions shall in no instance prohibit all manner of electromagnetic communication during any period of time between a lessee, its agents, employees, invitees, independent contractors or subcontractors and onshore facilities.

(c) Operational

The lessee, when operating or causing to be operated on its behalf, boat, ship, or aircraft traffic in the individual designated warning areas, shall enter into an agreement with the commander, or his/her designee, of the individual command headquarters, upon utilizing an individual designated warning area prior to commencing such traffic. Such an agreement will provide for positive control of boats, ships, and aircraft operating in the warning areas at all times.

Effectiveness of the Lease Stipulation

The hold harmless section of the military stipulation serves to protect the U.S. Government from liability in the event of an accident involving the lessee and military activities. The operations of the military and the lessee and its agents will not be affected by this section.

The electromagnetic emissions section of the stipulation requires the lessee and its agents to reduce and curtail the use of radio, CB, or other equipment emitting electromagnetic energy within some areas. This serves to reduce the impact of oil- and gas-related activity on the communications of military missions and reduces the possible impacts of electromagnetic energy transmissions on missile testing, tracking, and detonation.

The operational section requires notification to the military of oil- and gas-related activity to take place within a military use area. This allows the base commander to plan military missions and maneuvers that will avoid the areas where oil- and gas-related activities are taking place or to schedule around these activities. Prior notification helps reduce the potential impacts associated with vessels and helicopters traveling unannounced through areas where military activities are underway.

This stipulation reduces potential impacts, particularly in regards to safety, but it does not reduce or eliminate the actual physical presence of oil- and gas-related operations in areas where military operations are conducted. The reduction in potential impacts resulting from this stipulation makes multiple-use conflicts 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-related activities.

D.4 EVACUATION STIPULATION

This stipulation would be a part of any lease in the easternmost portion of the CPA and all blocks in the EPA portion of the proposed lease sale area resulting from a proposed action. An evacuation stipulation has been applied to all blocks leased in these areas since 2001. The Evacuation Stipulation is designed to protect the lives and welfare of offshore oil and gas personnel. Oil- and gas-related activities have the potential to occasionally interfere with specific requirements and operating parameters for the lessee's activities in accordance with the military stipulation clauses contained herein. If it is determined that the operations will result in interference with scheduled military missions in such a manner as to possibly jeopardize the national defense or to pose unacceptable risks to life and property, then a temporary suspension of operations and the evacuation of personnel may be necessary. The stipulation reads as follows:

Evacuation Stipulation

(a) The lessee, recognizing that oil and gas resource exploration, exploitation, development, production, abandonment, and site cleanup operations on the leased area of submerged lands may occasionally interfere with tactical military operations, hereby recognizes and agrees that the United States reserves and has the right to temporarily suspend operations and/or require evacuation on this lease in the interest of national security. Such suspensions are considered unlikely in this area. Every effort will be made by the appropriate military agency to provide as much advance notice as possible of the need to suspend operations and/or evacuate. Advance notice of fourteen (14) days shall normally be given before requiring a suspension or evacuation, but in no event will the notice be less than four (4) days. Temporary suspension of operations may include the evacuation of personnel, and appropriate sheltering of personnel not evacuated. Appropriate shelter means the protection of all lessee personnel for the entire duration of any Department of Defense activity from flying or falling objects or substances; it will be implemented by a written order from the BSEE Gulf of Mexico Region, Regional Supervisor for District Field Operations (RSDFO), after consultation with the appropriate command headquarters or other appropriate military agency, or higher authority. The appropriate command headquarters, military agency or higher authority will provide information to allow the lessee to assess the degree of risk to, and provide sufficient protection for, lessee's personnel and property. Such suspensions or evacuations for national security reasons will not normally exceed seventy-two (72) hours; however, any such suspension may be extended by order of the RSDFO. During such periods, equipment may remain in place, but all production, if any, must cease for the duration of the temporary suspension if so directed by the RSDFO. Upon cessation of any temporary suspension, the RSDFO will immediately notify the lessee such suspension has terminated and operations on the leased area can resume.

(b) The lessee shall inform the BSEE of the persons/offices to be notified to implement the terms of this stipulation.

(c) The lessee is encouraged to establish and maintain early contact and coordination with the appropriate command headquarters, in order to avoid or minimize the effects of conflicts with potentially hazardous military operations.

(d) The lessee is not entitled to reimbursement for any costs or expenses associated with the suspension of operations or activities or the evacuation of property or personnel in fulfillment of the military mission in accordance with subsections (a) through (c) above.

(e) Notwithstanding subsection (d), the lessee reserves the right to seek reimbursement from appropriate parties for the suspension of operations or activities or the evacuation of property or personnel associated with conflicting commercial operations.

Effectiveness of the Lease Stipulation

This stipulation would provide for the evacuation of personnel and shut-in of operations during any events conducted by the military that could pose a danger to ongoing oil- and gas-related operations. It is expected that the invocation of these evacuation requirements will be extremely rare.

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

D.5 Coordination Stipulation

This stipulation would be a part of any lease in the easternmost portion of the CPA and all blocks leased in the EPA portion of the proposed leased sale area. A coordination stipulation has been applied to all blocks leased in these areas since 2001. The Coordination Stipulation is designed to increase communication and cooperation between military authorities and offshore oil and gas operators. Specific requirements and operating parameters are established for the lessee's activities in accordance with the Military Stipulation clauses. For instance, if it is determined that the operations will result in interference with scheduled military missions in such a manner as to possibly jeopardize the national defense or to pose unacceptable risks to life and property, then certain measures become activated and the oil- and gas-related operations may be curtailed in the interest of national defense. The stipulation reads as follows and, as referenced in paragraph (a) of the stipulation, a list of military stipulation clauses will be included with each lease package subject to this stipulation.

Coordination Stipulation

(a) The placement, location, and planned periods of operation of surface structures on this lease during the exploration stage are subject to approval by the BOEM Regional Director (RD) after the review of an operator's EP. Prior to approval of the EP, the lessee shall consult with the appropriate command headquarters regarding the location, density, and the planned periods of operation of such structures, and to maximize exploration while minimizing conflicts with Department of Defense activities. When determined necessary by the appropriate command headquarters, the lessee will enter into a formal Operating Agreement with such command headquarters, that delineates the specific requirements and operating parameters for the lessee's activities in accordance with the military stipulation clauses contained herein. If it is determined that the final operations will result in interference with scheduled military missions in such a manner as to possibly jeopardize the national defense or to pose unacceptable risks to life and property, then the BOEM RD may approve the EP with conditions, disapprove it, or require modification in accordance with 30 CFR part 550. The RD will notify the lessee in writing of the conditions associated with plan approval, or the reason(s) for disapproval or required modifications. Moreover, if there is a serious threat of harm or damage to life or property, or if it is in the interest of national security or defense, pending or approved operations may be suspended in accordance with 30 CFR part 250 or 30 CFR part 550. Such a suspension will extend the term of a lease by an amount equal to the length of the suspension. The BSEE RD will attempt to minimize such suspensions within the confine of related military requirements. It is recognized that the issuance of a lease conveys the right to the lessee as provided in section 8(b)(4) of the Outer Continental Shelf Lands Act, 43 U.S.C. § 1337(b)(4), to engage in exploration, development, and production activities conditioned upon other statutory and regulatory requirements.

(b) The lessee is encouraged to establish and maintain early contact and coordination with the appropriate command headquarters, in order to avoid or minimize the effects of conflicts with potentially hazardous military operations.

(c) If national security interests are likely to be in continuing conflict with an existing Operating Agreement, EP, DPP, or DOCD, the BSEE RD, in consultation with BOEM, will direct the lessee to modify any existing operating agreement or to enter into a new operating agreement to implement measures to avoid or minimize the identified potential conflicts, subject to the terms and conditions and obligations of the legal requirements of the lease.

Effectiveness of the Lease Stipulation

This stipulation would provide for review of pending oil and gas operations by military authorities and could result in delaying oil and gas operations if military activities have been scheduled in the area that may put the oil and gas operations and personnel at risk.

D.6 Blocks South of Baldwin County, Alabama, Stipulation

This stipulation will be included only on leases on blocks south of and within 15 mi (24 km) of Baldwin County, Alabama. The stipulation reads as follows:

Blocks South of Baldwin County, Alabama, Stipulation

(a) In order to minimize visual impacts from development operations on this block, you will contact lessees and operators of leases in the vicinity prior to submitting a DOCD to determine if existing or planned surface production structures can be shared. If feasible, your DOCD should reflect the results of any resulting sharing agreement, propose the use of subsea technologies, or propose another development scenario that does not involve new surface structures.

(b) If you cannot formulate a feasible development scenario that does not call for new surface structure(s), your DOCD should ensure that they are the minimum necessary for the proper development of the block and that they will be constructed and placed, using orientation, camouflage, or other design measures, to limit their visibility from shore.

(c) The BOEM will review and make decisions on your DOCD in accordance with applicable Federal regulations and BOEM policies, and in consultation with the State of Alabama (Geological Survey/Oil and Gas Board).

Effectiveness of the Lease Stipulation

For several years, the then-Governor of Alabama had indicated opposition to new leasing south and within 15 mi (24 km) of Baldwin County but requested that, if the area is offered for lease, a lease stipulation to reduce the potential for visual impacts should be applied to all new leases in this area. Prior to the decision in 1999 on the Final Notice of Sale for Lease Sale 172, BOEM's Gulf of Mexico OCS Region's 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. A lessee's development operations coordination document (DOCD) should reflect the results of any resulting sharing agreement, should propose the use of subsea technologies, or should propose another development scenario that does not involve new surface structures. If the lessee cannot formulate a feasible development scenario that does not call for new surface structure(s), the lessee's DOCD should ensure that the structures are the minimum necessary for the proper development of the block and that they will be constructed and placed, using orientation, camouflage, or other design measures, in such a manner as to limit their visibility from shore. The stipulation has been continually adopted in annual CPA lease sales since and has effectively mitigated visual impacts.

D.7 Protected Species Stipulation

The Protected Species Stipulation has been applied to all blocks leased in the GOM since December 2001. This stipulation was developed in consultation with the U.S. Department of Commerce, National Oceanic and Atmospheric Administration, NMFS and the U.S. Department of the Interior, FWS in accordance with Section 7 of the Endangered Species Act, and it is designed to minimize or avoid potential adverse impacts to federally protected species.

Protected Species Stipulation

A. The Federal Endangered Species Act (ESA; 16 U.S.C. §§ 1531-1544) and the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1361-1423h) are designed to protect threatened and endangered species and marine mammals and apply to activities on the Outer Continental Shelf (OCS). The Outer Continental Shelf Lands Act (OCSLA; at 43 U.S.C. §§ 1331-1356a) provides that the OCS should be made available for expeditious and orderly development subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs (see 43 U.S.C. § 1332). BOEM and BSEE comply with these laws on the OCS.

B. The lessee and its operators must:

(1) collect and remove flotsam resulting from activities related to exploration, development, and production of this lease;

(2) post signs in prominent places on all vessels and platforms used as a result of activities related to exploration, development, and production of this lease detailing the reasons (legal and ecological) why release of debris must be eliminated;

(3) observe for marine mammals and sea turtles while on vessels, reduce vessel speed to 10 knots or less when assemblages of cetaceans are observed, and maintain a distance of 91 meters or greater from whales, and a distance of 45 meters or greater from small cetaceans and sea turtles;

(4) employ mitigation measures prescribed by BOEM/BSEE or the National Marine Fisheries Service (NMFS) for all seismic surveys, including the use of an “exclusion zone” based upon the appropriate water depth, ramp-up and shutdown procedures, visual monitoring, and reporting;

(5) identify important habitats, including designated critical habitat, used by listed species (e.g., sea turtle nesting beaches, piping plover critical habitat), in oil spill contingency planning and require the strategic placement of spill cleanup equipment to be used only by personnel trained in less-intrusive cleanup techniques on beaches and bay shores; and

(6) immediately report all sightings and locations of injured or dead protected species (e.g., marine mammals and sea turtles) to the appropriate stranding network. If oil and gas industry activity is responsible for the injured or dead animal (e.g., because of a vessel strike), the responsible parties should remain available to assist the stranding network. If the injury or death was caused by a collision with the lessee's vessel, the lessee must notify BSEE within 24 hours of the strike in accordance with NTL No. 2016-BOEM-G01 (Vessel Strike Avoidance and Injured/Dead Protected Species Reporting).

C. BOEM and BSEE issue Notices to Lessees (NTLs) which more fully describe measures implemented in support of the above-mentioned implementing statutes and regulations, as well as measures identified by the U.S. Fish and Wildlife Service and NMFS arising from, among others, conservation recommendations, rulemakings pursuant to the MMPA, or consultation. The lessee and its operators, personnel, and subcontractors, while undertaking activities authorized under this lease, must implement and comply with the specific mitigation measures outlined in: NTL No. 2016-BOEM-G01 (Vessel Strike Avoidance and Injured/Dead Protected Species Reporting), NTL No. 2016-BOEM-G02 (Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program), and NTL No. 2015-BSEE-G03 (Marine Trash and Debris Awareness and Elimination). At the lessee's option, the lessee, its operators, personnel and contractors may comply with the most current measures to protect species in place at the time an activity is undertaken under this lease, including but not limited to new or updated versions of the NTLs identified in this paragraph. The lessee and its operators, personnel and subcontractors will be required to comply with the mitigation measures, identified in the above referenced NTLs, and additional measures in the conditions of approvals for their plans or permits.

Effectiveness of the Lease Stipulation

This stipulation was developed in consultation with NMFS and FWS, and is designed to minimize or avoid potential adverse impacts to federally protected species. The stipulation immediately implements existing mitigations on postlease activities and notifies lessees that subsequent approvals for oil and gas activities may include additional mitigations (as conditions of approval) when those actions have the potential to impact marine mammals, sea turtles, and other federally protected species. Among others, these requirements and conditions provide protection by ensuring the animals remain a minimum distance from the operations or the activity.

D.8 United Nations Convention on the Law of the Sea Royalty Payment Stipulation

If the United States becomes a party to the 1982 United Nations Convention on the Law of the Sea (UNCLOS) prior to or during the life of a lease issued by the United States on a block or portion of a block located beyond its Exclusive Economic Zone as defined in UNCLOS, and subject to such conditions that the Senate may impose through its constitutional role of advice and consent, then the royalty payment lease provisions will apply to the lease so issued, consistent with Article 82 of UNCLOS.

Law of the Sea Convention Royalty Payment Stipulation

(A) UNCLOS requires payments annually by coastal states party to the Convention with respect to all production at a site after the first five years of production at that site. Any such payments will be made by the U.S. Government and not the lessee.

(B) For the purpose of this stipulation regarding payments by the lessee to the U.S., each lease constitutes a separate site, whether or not a lease is committed to a unit.

(C) For the purpose of this stipulation, the first production year begins on the first day of commercial production (excluding test production). Once a production year begins, it will run for a period of 365 days whether or not the lease produces continuously in commercial quantities. Subsequent production years shall begin on the anniversary date of first production.

(D) If total lease production during the first five years following first production exceeds the total royalty suspension volume(s) provided in the lease terms, or through application and approval of relief from royalties, the following provisions of this stipulation will not apply. If, after the first five years of production, but prior to termination of this lease, production exceeds the total royalty suspension volume(s) provided in the lease terms or through application and approval of relief from royalties, the provisions of this stipulation will no longer apply effective the day after the suspension volumes have been produced.

(E) If, in any production year after the first five years of lease production, due to lease royalty suspension provisions or through application and approval of relief from royalties, no lease production royalty is due or payable by the lessee to the U.S., then the lessee will be required to pay, as stipulated in paragraph I below, Convention-related royalty in the following amount so that the required Convention payments may be made by the U.S. Government, as provided under the Convention:

(1) In the sixth year of production, 1 percent of the value of the sixth year's lease production saved, removed, or sold from the leased area;

(2) After the sixth year of production, the Convention-related royalty payment rate shall increase by 1 percent for each subsequent year until the twelfth year and shall remain at 7 percent thereafter until lease termination.

(F) If the U.S. becomes a party to UNCLOS after the fifth year of production from the lease, and a lessee is required, as provided herein, to pay Convention-related royalty, the amount of the royalty due will be based on the above payment schedule as determined from first production. For example, the U.S. Government becomes a party to the UNCLOS in the tenth year of lease production resulting in a UNCLOS-related royalty payment of 5 percent of the value of the tenth year's lease production, saved, removed, or sold from the lease. The following year, a payment of 6 percent would be due, and so forth, as stated above, up to a maximum of 7 percent per year.

(G) If, in any production year after the first five years of lease production, due to lease royalty suspension provisions or through application and approval of relief from royalties, lease production royalty is paid but is less than the payment provided for by the Convention, then the lessee will be required to pay to the U.S. Government the UNCLOS-related royalty in the amount of the shortfall.

(H) In determining the value of production from the lease if a payment of UNCLOS-related royalty is to be made, the provisions of the lease and applicable regulations will apply.

(I) The UNCLOS-related royalty payment(s) required under paragraphs E through G of this stipulation, if any, shall not be paid monthly but will be due and payable to the Office of Natural Resources Revenue on or before 30 days after the expiration of the relevant production lease year.

(J) The lessee will receive royalty credit in the amount of the UNCLOS-related royalty payment required under paragraphs E through G of this stipulation, which will apply to royalties due under the lease for which the Convention-related royalty accrued in subsequent periods, as non-UNCLOS-related royalty payments become due.

(K) Any lease production for which the lessee pays no royalty other than a UNCLOS-related requirement, due to lease royalty suspension provisions or through application and approval of relief from royalties, will count against the lease's applicable royalty suspension or relief volume.

(L) The lessee will not be allowed to apply or recoup any unused UNCLOS-related credit(s) associated with a lease that has been relinquished or terminated.

D.9 Below Seabed Operations Stipulation

This stipulation is designed to minimize or avoid potential space-use conflicts with moored and/or floating production facilities that have already been granted rights-of-use and easements in particular OCS blocks. The stipulation language below is intended to be lease sale-specific language and would incorporate maps of the blocks that may be affected by the Below Seabed Operations Stipulation.

Below Seabed Operations Stipulation

> Rights-of-use and easements have been granted to allow permanent mooring of floating production facilities. As a result, any lessee holding an interest in oil and gas leases for these blocks is not allowed to conduct activities, including, but not limited to, the construction and use of structures, operation of drilling rigs, laying of pipelines, and/or anchoring, will occur or be located on the seafloor or in the water column within the areas depicted by the attached maps. Subseabed activities that are part of exploration, development, and production activities from outside the areas depicted by the attached maps may be allowed, including the use of directional drilling or other techniques.

This stipulation will be included in any lease awarded from this lease sale on the following list of blocks. (The list of blocks is updated in the Final Notice of Sale before each lease sale, but it currently includes the blocks below.)

Mississippi Canyon 650, 651, 692, 694, 723, 735, 767, 919, 920, 921, and 964;

Walker Ridge 293 and 294, 717, 762, and 763;

Green Canyon 613, 786, 787, 788, and 860; and

Keathley Canyon 831.

Effectiveness of the Lease Stipulation

This stipulation is designed to minimize or avoid potential space-use conflicts with moored and/or floating production facilities that have already been granted rights-of-use and easements in particular OCS blocks. BOEM has effectively used this stipulation for over a decade to make bidders aware of other activities with rights-of-use and easements on the above OCS blocks and may require buffers or additional requirements prior to acquiring leases on those specific blocks.

D.10 Transboundary Stipulation

This stipulation incorporates by reference the Agreement and notifies lessees that, among other things, activities in this boundary area will be subject to the Agreement and that approval of plans, permits, and unitization agreements will be conditioned upon compliance with the terms of the Agreement.

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

The "Agreement between the United States of America and the United Mexican States Concerning Transboundary Hydrocarbon Reservoirs in the Gulf of Mexico" (Agreement) signed on February 20, 2012, entered into force on July 18, 2014. All activities carried out under this lease must comply with the Agreement and any law, regulation, or condition of approval of a unitization agreement, plan, or permit adopted by the United States to implement the Agreement before or after issuance of this lease. The lessee is subject to, and must comply with, all terms of the Agreement, including, but not limited to, the following requirements:

This Agreement makes it possible for U.S. lessees to enter into voluntary agreements with a licensee of the United Mexican States (e.g., Petróleos Mexicanos (PEMEX)) to develop transboundary reservoirs. Lessees in the Boundary Area may be subject to certain provisions of the Agreement.

A. When the United States is obligated under the Agreement to provide information that may be considered confidential, commercial, or proprietary to a third-party or the Government of the United Mexican States, if the lessee holds such information, the lessee is required to provide it to the lessor as provided for in the Agreement;

B. When the United States is obligated under the Agreement to prohibit commencement of production on a lease, the Bureau of Safety and Environmental Enforcement (BSEE) will direct a Suspension of Production with which the lessee must comply;

C. When the United States is obligated under the Agreement to seek development of a transboundary reservoir under a unitization agreement, the lessee is required to cooperate and explore the feasibility of such development with a licensee of the United Mexican States;

D. When there is a proven transboundary reservoir, as defined by the Agreement, and the relevant parties, including the lessee, fail to conclude a unitization agreement, the lessee's rights to produce the hydrocarbon resources will be limited by the terms of the Agreement;

E. If the lessee seeks to jointly explore or develop a transboundary reservoir with a licensee of the United Mexican States, the lessee is required to submit to BSEE information and documents that comply with and contain terms consistent with the Agreement, including, but not limited to, a proposed unitization agreement that designates the unit operator for the transboundary unit and provides for the allocation of production and any redetermination of the allocation of production; and

F. The lessee is required to comply with and abide by determinations issued as a result of the Agreement's dispute resolution process on, among other things, the existence of a transboundary reservoir, and the allocation and/or reallocation of production.

The lessee and its operators, personnel, and subcontractors are required to comply with these and any other additional measures necessary to implement the provisions of the Agreement, including, but not limited to, conditions of approvals for their plans and permits for activities related to any transboundary reservoir or geologic structure subject to the Agreement.

The term "Boundary Area," means an area comprised of any and all blocks in the Western and Central Planning Areas, that are located wholly or partially within three statute miles of the Maritime and Continental Shelf boundary with Mexico, as the Maritime Boundary is delimited in the Treaty to Resolve Pending Boundary Differences and Maintain the Rio Grande and Colorado River as the International Boundary, signed November 24, 1970; the Treaty on Maritime Boundaries between the United Mexican States and the United States of America, signed on May 4, 1978; and, as the continental shelf in the Western Gulf of Mexico beyond 200 nautical miles is delimited in the Treaty between the Government of the United Mexican States and the Government of the United States of America, signed on June 9, 2000.

A copy of the Agreement can be found at the Department of the Interior website at: http://www.boem.gov/BOEM-Newsroom/Library/Boundaries-Mexico.aspx.

Effectiveness of the Lease Stipulation

The Transboundary Agreement removes uncertainties regarding development of transboundary resources in the resource-rich Gulf of Mexico. As a result of the agreement, nearly 1.5 million ac of the OCS will now be made more accessible for exploration and production activities. BOEM's estimates indicate that this area contains as much as 172 million barrels of oil and 304 billion cubic feet of natural gas. The Agreement also opens up resources in the Western Gap that were off limits to both countries under a previous treaty that imposed a moratorium along the boundary. The Transboundary Agreement sets clear guidelines for the development of oil and natural gas reservoirs that cross the maritime boundary. Under the Agreement, U.S. companies and PEMEX will be able to voluntarily enter into agreements to jointly develop those reservoirs. In the event that consensus cannot be reached, the Transboundary Agreement establishes the process through which U.S. companies and PEMEX can individually develop the resources on each side of the border while protecting each nation's interests and resources.

D.11 References

Barry A. Vittor and Associates, Inc. 1985. Tuscaloosa Trend regional data search and synthesis study. Volume I: Synthesis report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, Metairie, LA. OCS Study MMS 85-0056. 398 pp.

Bright, T.J. and R. Rezak. 1978. Northwestern Gulf of Mexico topographic features study: Final report. U.S. Dept. of the Interior, Bureau of Land Management, New Orleans OCS Office, New Orleans, LA. Study No. 1978-4. 692 pp. Internet website: http://www.gomr.boemre.gov/PI/PDFImages/ESPIS/3/4069.pdf.

Brooks, J.M. and C.P. Giammona. 1990. Mississippi-Alabama marine ecosystem study: Annual report; year 2. Volume I: Technical narrative. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 89-0095. 348 pp.

Ludwick, J.C. and W.R. Walton. 1957. Shelf-edge, calcareous prominences in the northeastern Gulf of Mexico. Bulletin of the American Association of Petroleum Geologists 41(9):2054-2101.

National Research Council (NRC). 1983. Drilling discharges in the marine environment. Panel on Assessment of Fates and Effects of Drilling Fluids and Cuttings in the Marine Environment. National Research Council, Commission on Engineering and Technical Systems, Marine Board. Washington, DC: National Academy Press. Pp. 18-21.

Rezak, R. and T.J. Bright. 1981. Northern Gulf of Mexico topographic features study: Final report. U.S. Dept. of the Interior, Bureau of Land Management, Gulf of Mexico OCS Region, New Orleans, LA. Contract No. AA551-CT8-35. 5 vols.

Rezak, R., T.J. Bright, and D.W. McGrail. 1983. Reefs and banks of the northwestern Gulf of Mexico: Their geological, biological, and physical dynamics. Final Technical Report No. 83-1-T.

Rezak, R., T.J. Bright, and D.W. McGrail. 1985. Reefs and banks of the northwestern Gulf of Mexico: Their geological, biological, and physical dynamics. New York, NY: Wiley and Sons. 259 pp.

Rezak, R., S.R. Gittings, and T.J. Bright. 1990. Biotic assemblages and ecological controls on reefs and banks of the northwest Gulf of Mexico. American Zoologist 30:23-35.

APPENDIX E

OIL SPILL RISK ANALYSIS FIGURES

E OIL SPILL RISK ANALYSIS FIGURES

The following figures comprise the results of the Oil Spill Risk Analysis (OSRA) conducted for Alternatives A, B, and C. All of the assumptions and scenario estimates for Alternative D (including the commonly applied mitigating measures in **Appendix B**) are the same as for a proposed action under Alternative A, B, or C; consequently, refer to the corresponding Alternative A, B, or C for information relevant to Alternative D. **Chapter 3.2.1** of this Multisale EIS provides for a discussion of oil spills and the OSRA model. In summary, oil-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 a specified geographic area or feature. These are referred to as "combined probabilities" because they combine the risk of occurrence of a spill from OCS sources and the risk of such a spill contacting areas of sensitive environmental, social, and economic resources. **Figure E-1** shows the geographic boundaries, known as the domain, used for the analysis. **Figures E-2 through E-7** show the probabilities of oil spills (≥1,000 bbl) occurring and contacting within 10 or 30 days the shoreline (counties and parishes) as a result of an Alternative A, B, or C proposed action. **Figures E-8 through E-19** show the probabilities of oil spills (≥1,000 bbl) occurring and contacting within 10 or 30 days nearshore (0-20 m), shelf (20-300 m), and deepwater (300 m to outer jurisdiction) areas as a result of the low- or high-case scenario of resource estimates for Alternatives A, B, or C. Lastly, **Figure E-20** shows the probabilities of oil spills (≥1,000 bbl) occurring and contacting within 10 days and 30 days State offshore waters as a result of Alternative A, B, or C.

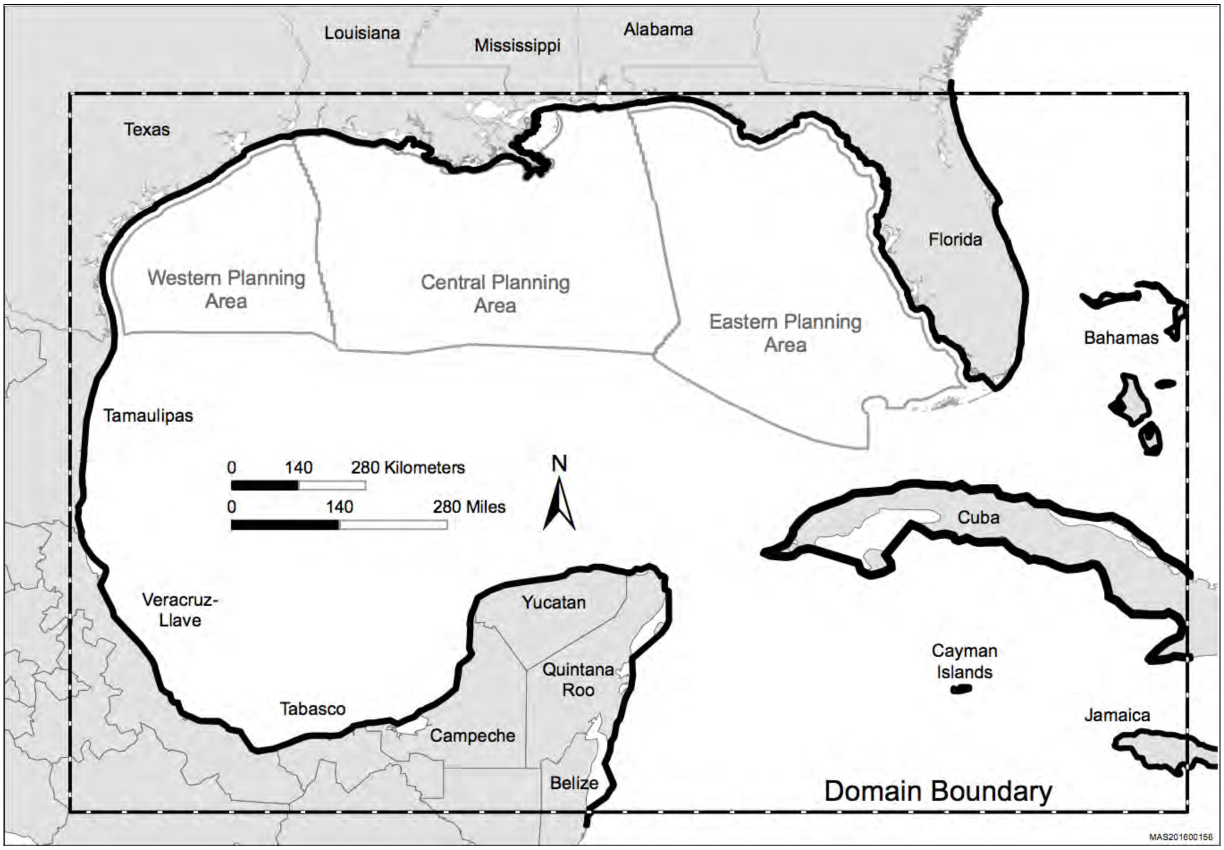

Figure E-1. The Oil Spill Risk Analysis Domain.

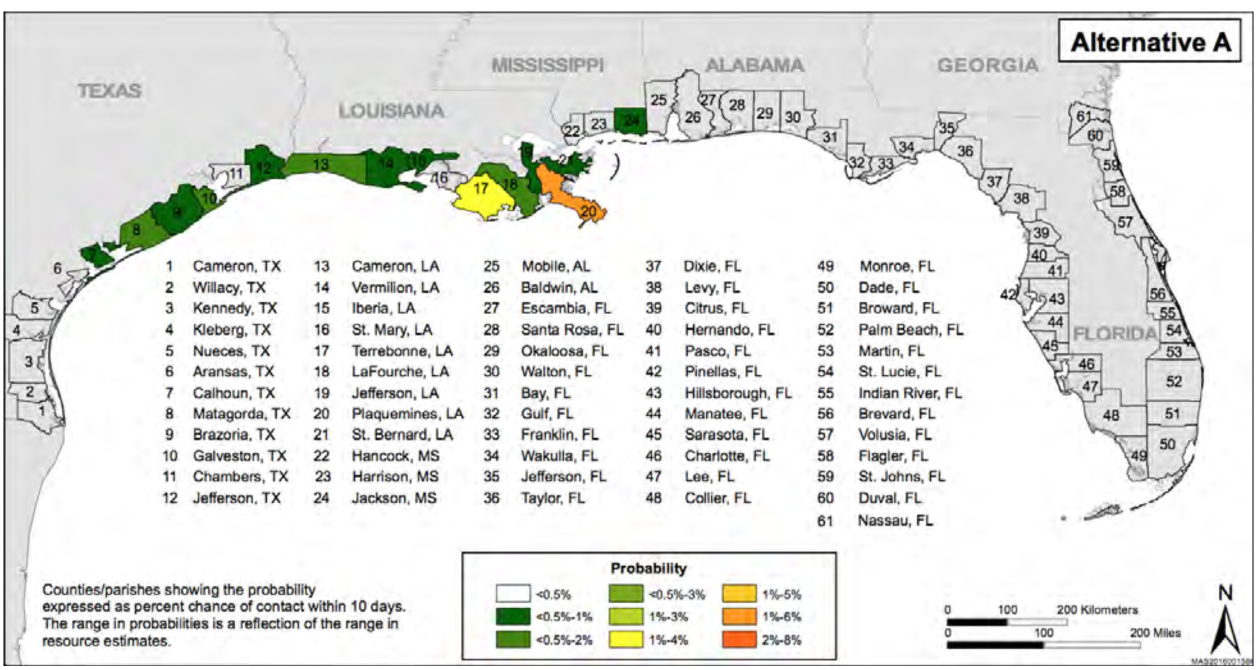

Figure E-2. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days the Shoreline (counties and parishes) as a Result of Alternative A.

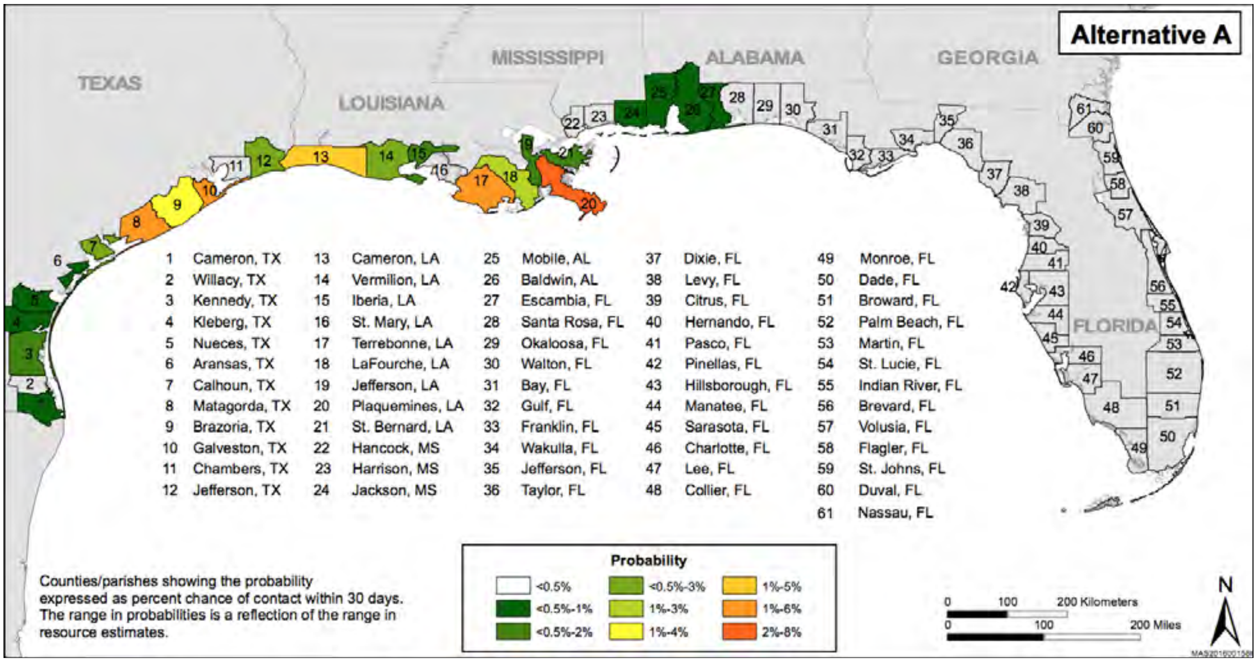

Figure E-3. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 30 Days the Shoreline (counties and parishes) as a Result of Alternative A.

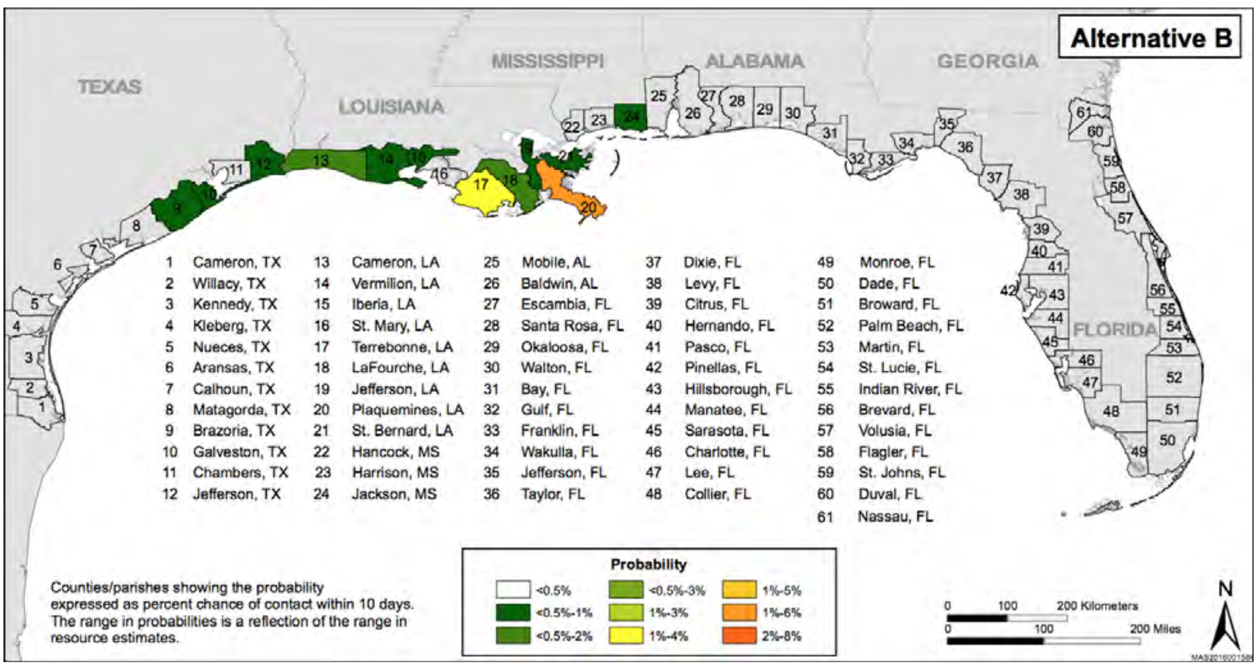

Figure E-4. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days the Shoreline (counties and parishes) as a Result of Alternative B.

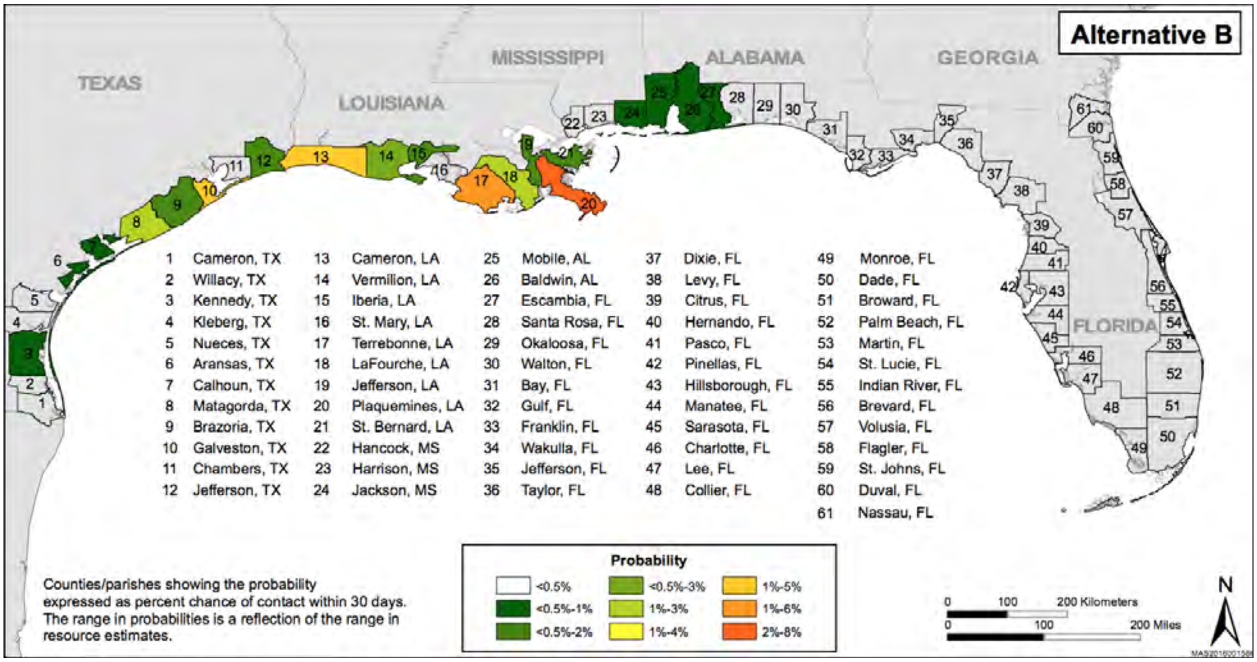

Figure E-5. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 30 Days the Shoreline (counties and parishes) as a Result of Alternative B.

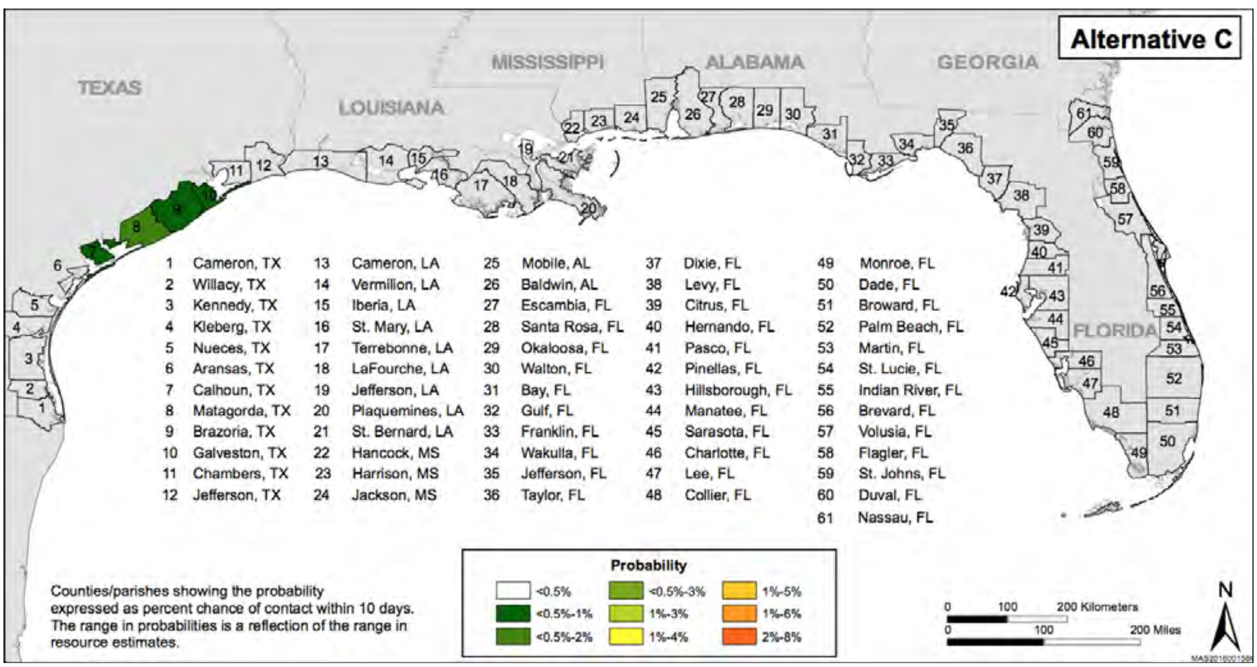

Figure E-6. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days the Shoreline (counties and parishes) as a Result of Alternative C.

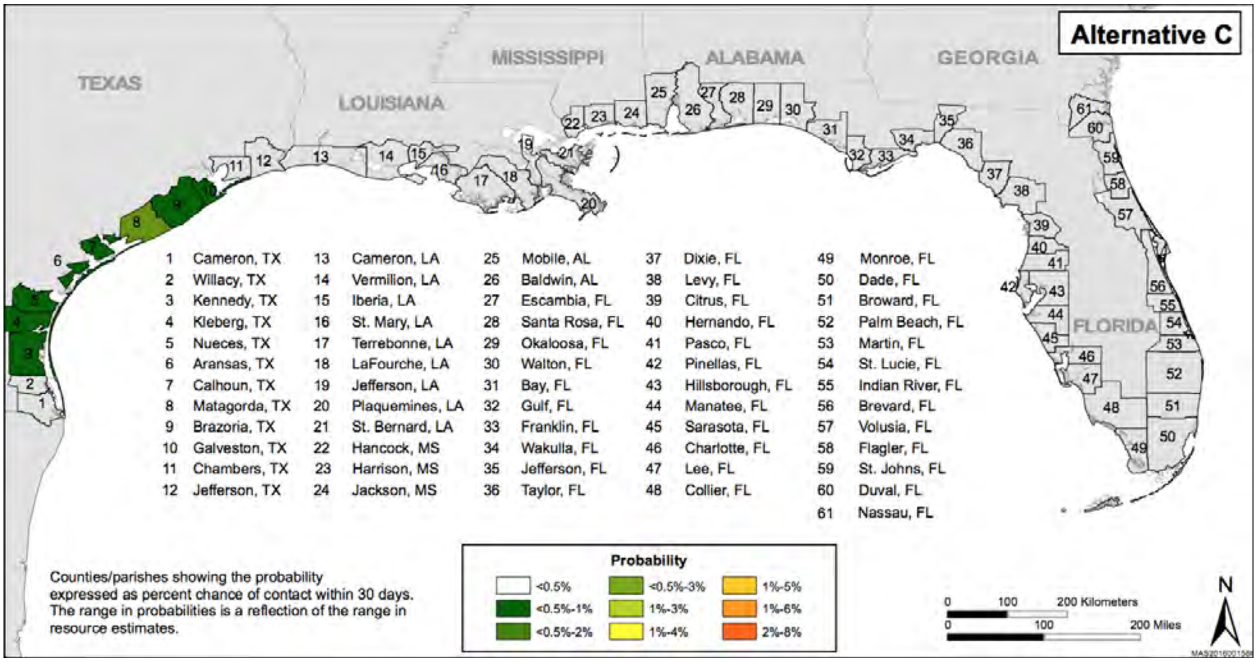

Figure E-7. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 30 Days the Shoreline (counties and parishes) as a Result of Alternative C.

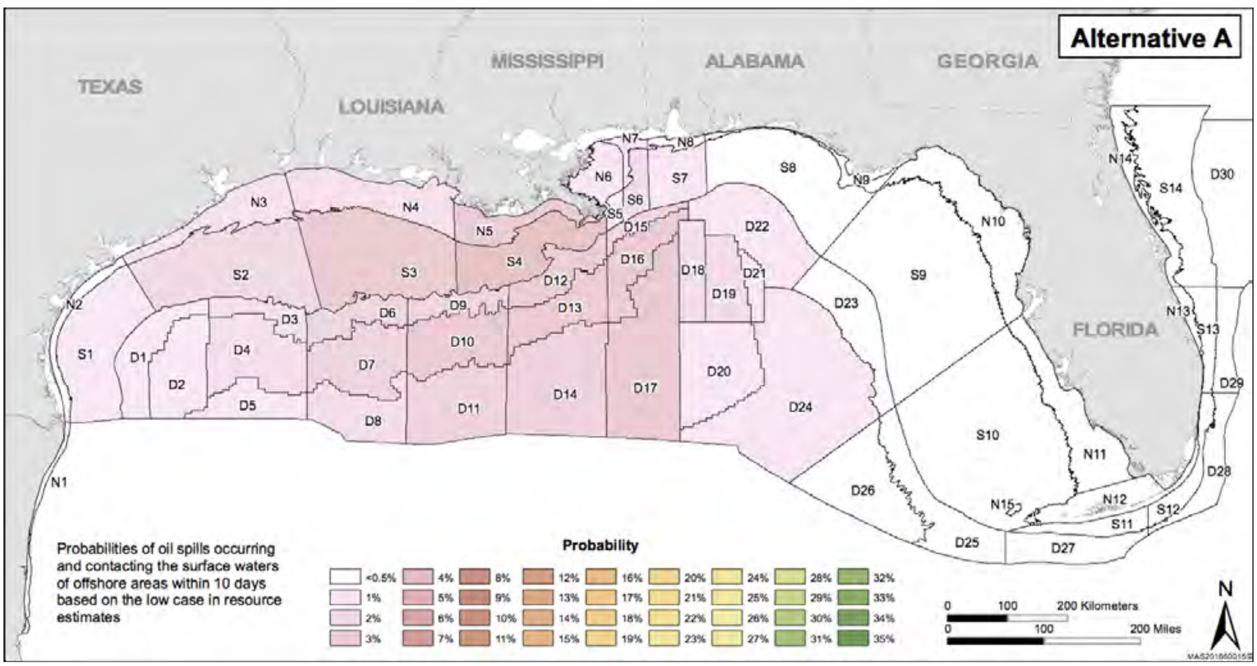

Figure E-8. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days Nearshore ("N", 0-20 m), Shelf ("S", 20-300 m), and Deepwater ("D", 300 m to outer jurisdiction) Polygons as a Result of the Low Case in Resource Estimates for Alternative A.

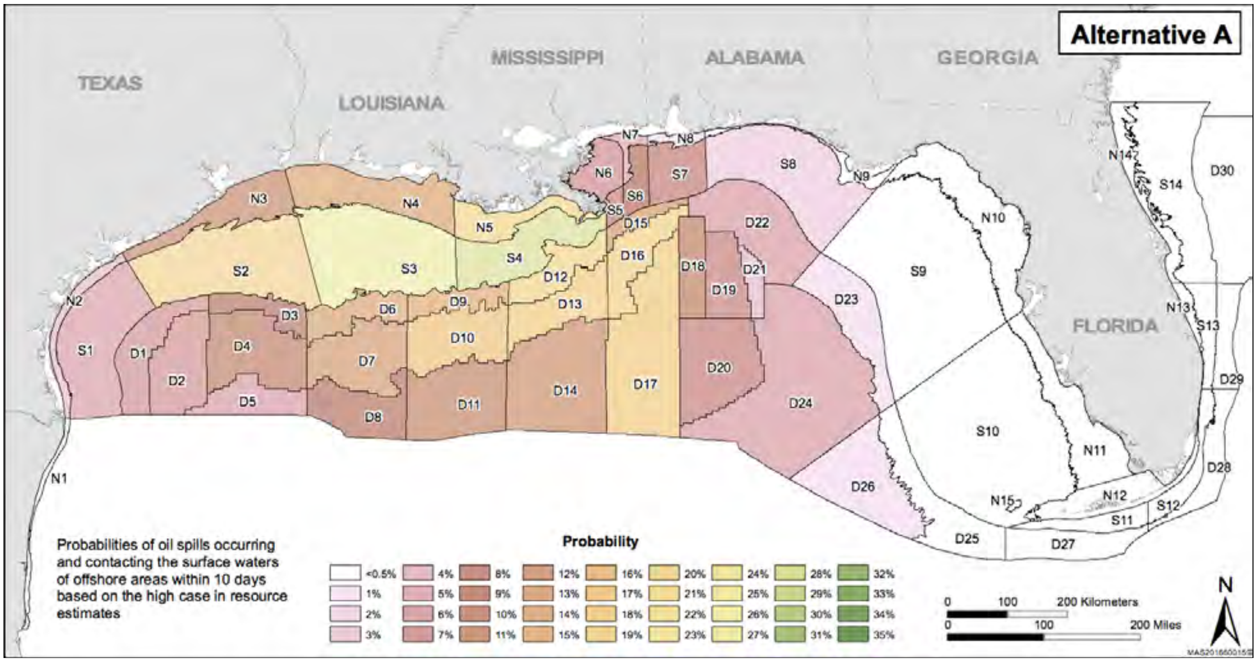

Figure E-9. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days Nearshore ("N", 0-20 m), Shelf ("S", 20-300 m), and Deepwater ("D", 300 m to outer jurisdiction) Polygons as a Result of the High Case in Resource Estimates for Alternative A.

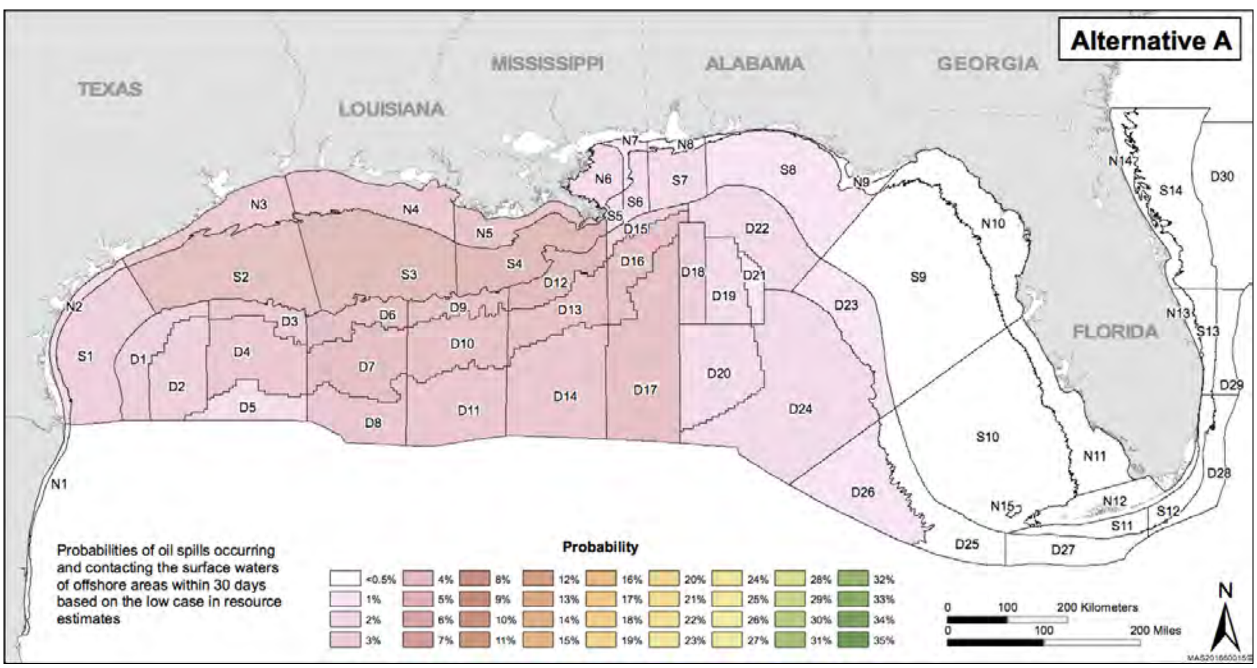

Figure E-10. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 30 Days Nearshore ("N", 0-20 m), Shelf ("S", 20-300 m), and Deepwater ("D", 300 m to outer jurisdiction) Polygons as a Result of the Low Case in Resource Estimates for Alternative A.

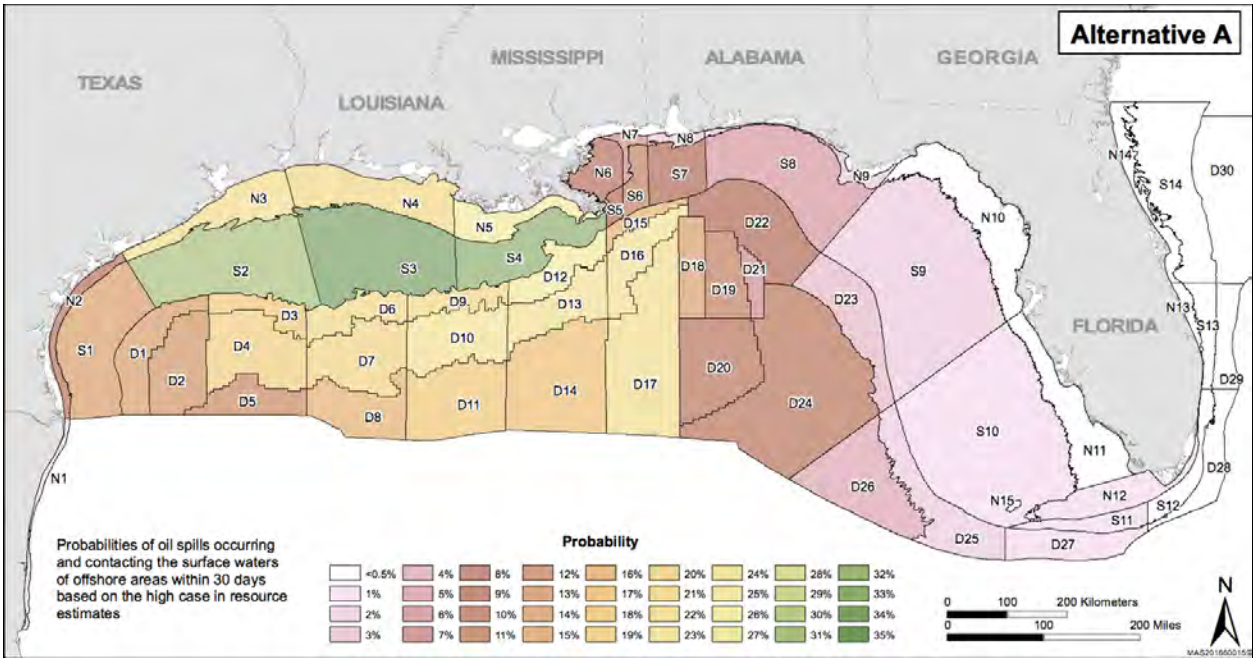

Figure E-11. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 30 Days Nearshore ("N", 0-20 m), Shelf ("S", 20-300 m), and Deepwater ("D", 300 m to outer jurisdiction) Polygons as a Result of the High Case in Resource Estimates for Alternative A.

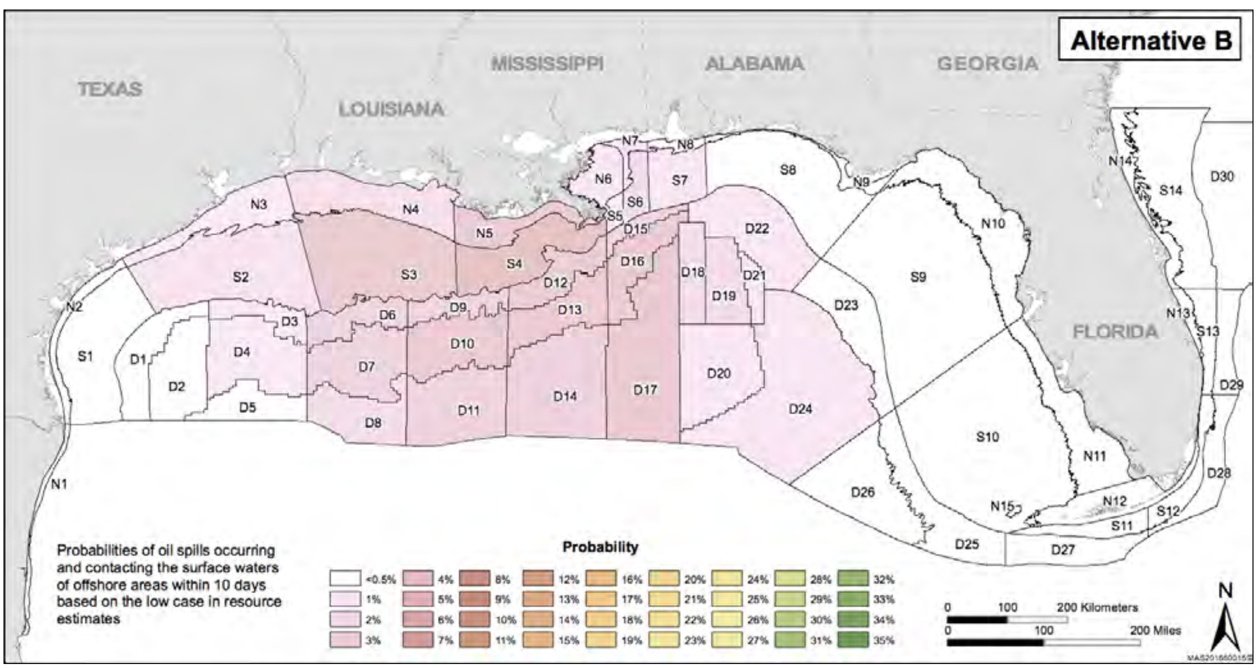

Figure E-12. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days Nearshore ("N", 0-20 m), Shelf ("S", 20-300 m), and Deepwater ("D", 300 m to outer jurisdiction) Polygons as a Result of the Low Case in Resource Estimates for Alternative B.

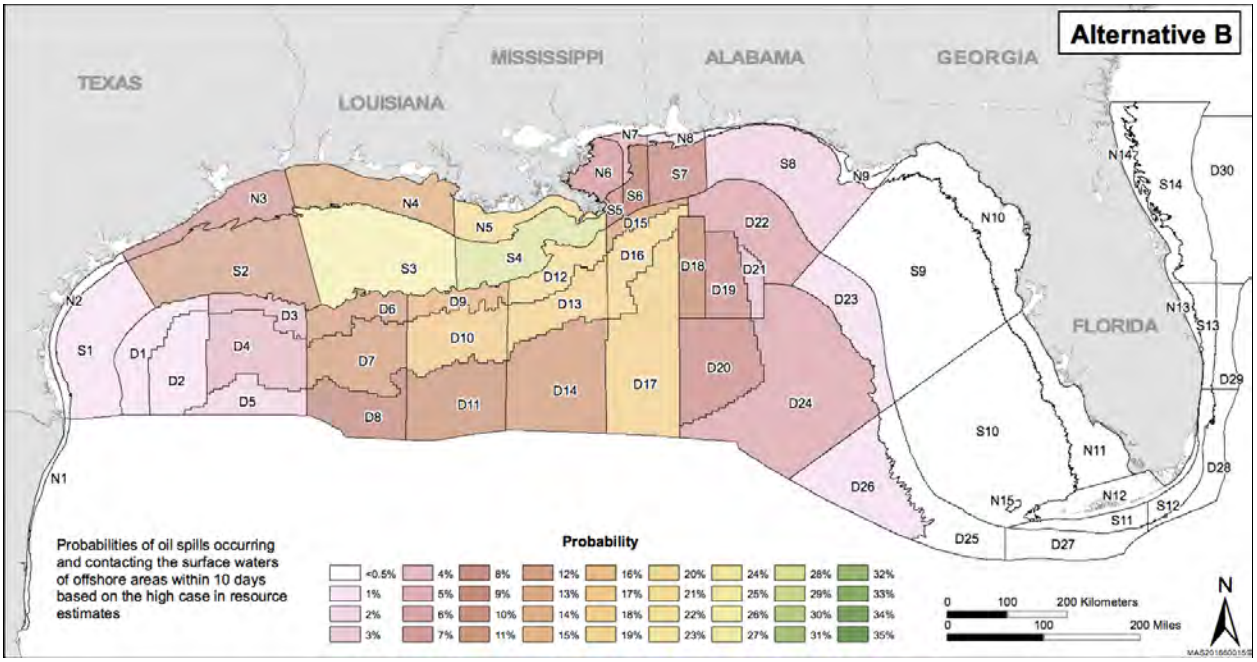

Figure E-13. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days Nearshore ("N", 0-20 m), Shelf ("S", 20-300 m), and Deepwater ("D", 300 m to outer jurisdiction) Polygons as a Result of the High Case in Resource Estimates for Alternative B.

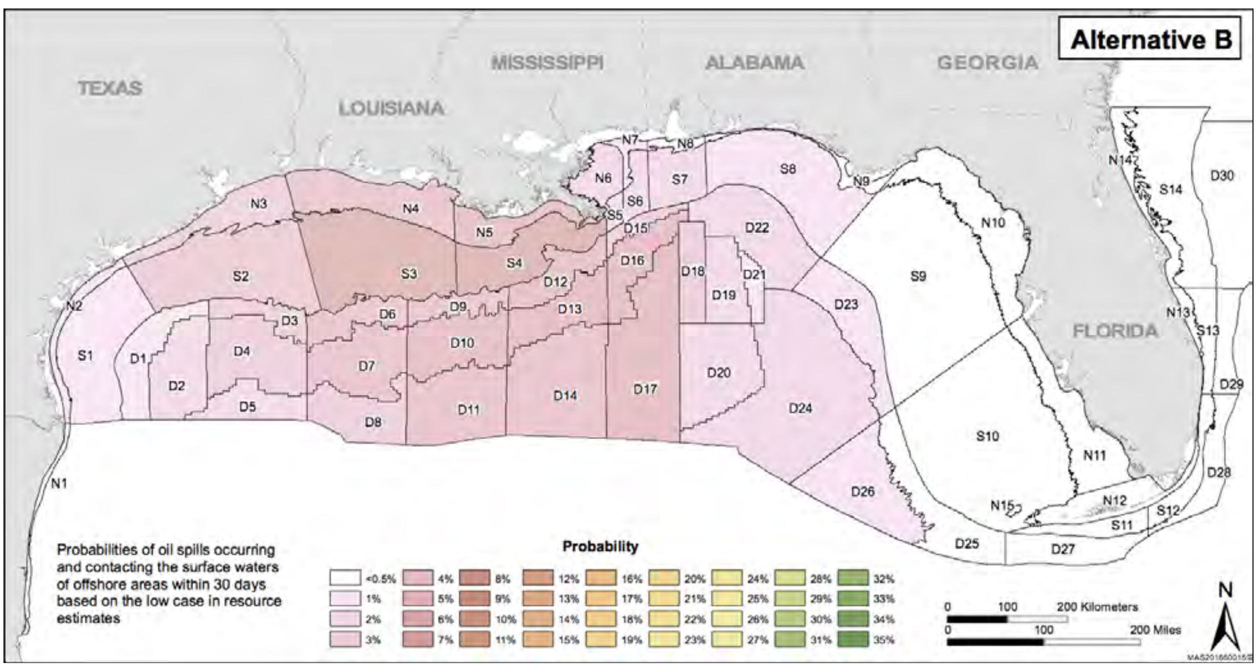

Figure E-14. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 30 Days Nearshore ("N", 0-20 m), Shelf ("S", 20-300 m), and Deepwater ("D", 300 m to outer jurisdiction) Polygons as a Result of the Low Case in Resource Estimates for Alternative B.

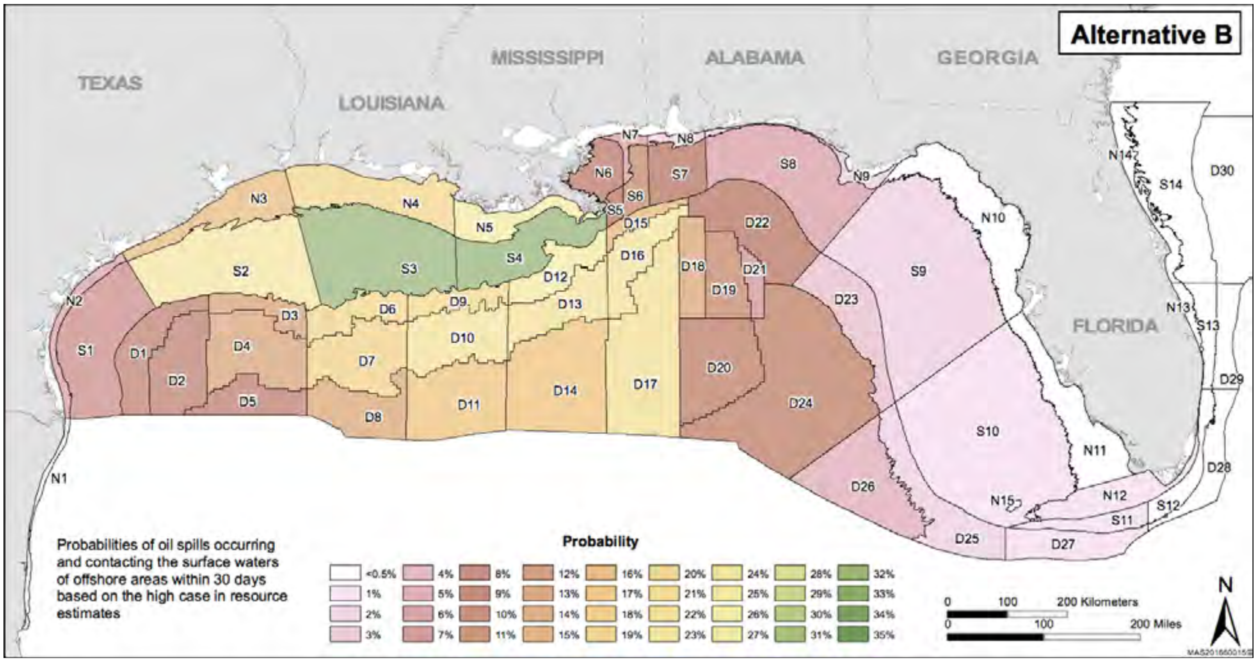

Figure E-15. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 30 Days Nearshore ("N", 0-20 m), Shelf ("S", 20-300 m), and Deepwater ("D", 300 m to outer jurisdiction) Polygons as a Result of the High Case in Resource Estimates for Alternative B.

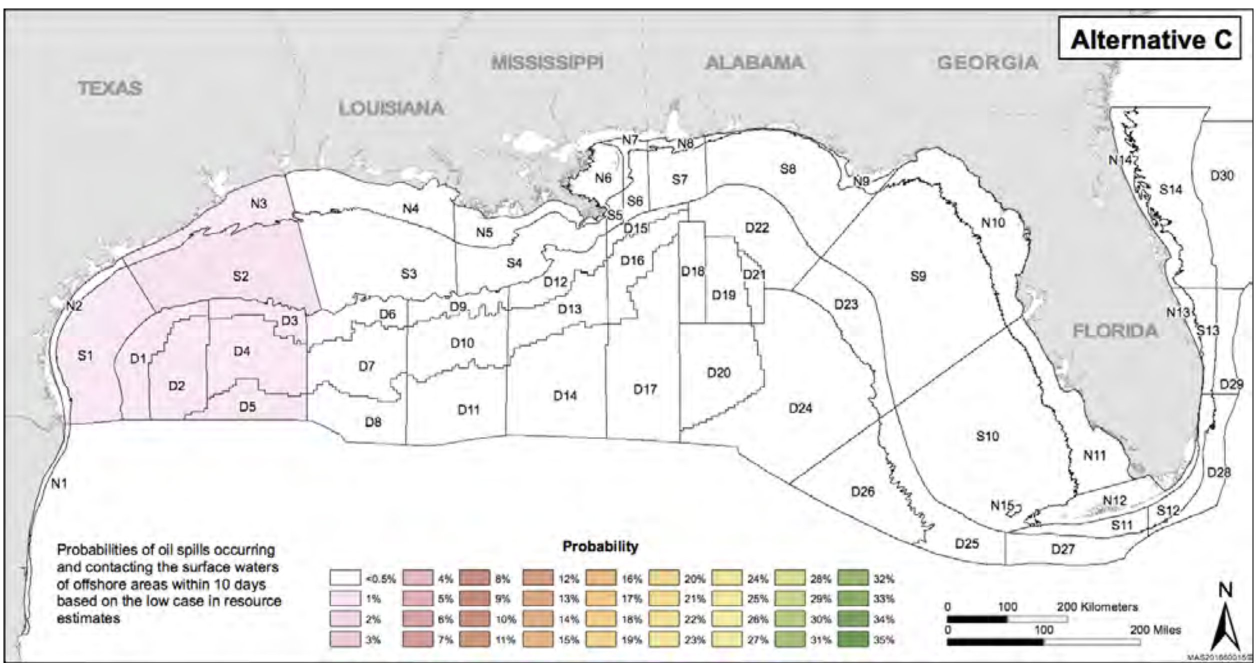

Figure E-16. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days Nearshore ("N", 0-20 m), Shelf ("S", 20-300 m), and Deepwater ("D", 300 m to outer jurisdiction) Polygons as a Result of the Low Case in Resource Estimates for Alternative C.

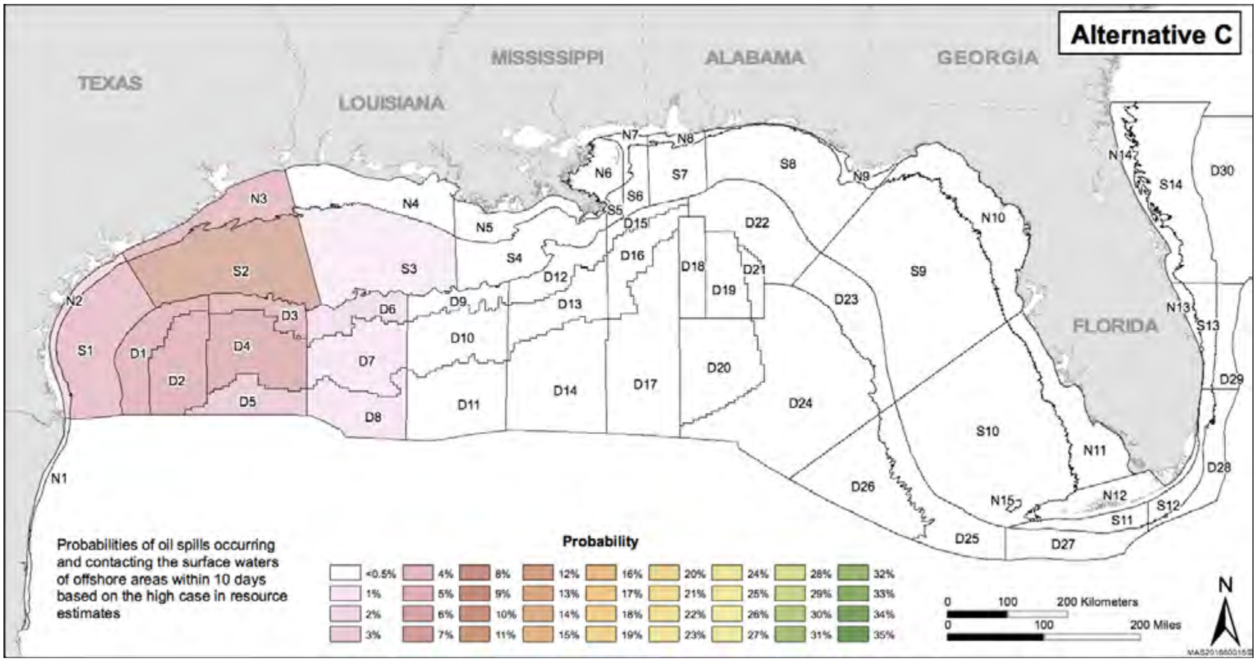

Figure E-17. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days Nearshore (“N”, 0-20 m), Shelf (“S”, 20-300 m), and Deepwater (“D”, 300 m to outer jurisdiction) Polygons as a Result of the High Case in Resource Estimates for Alternative C.

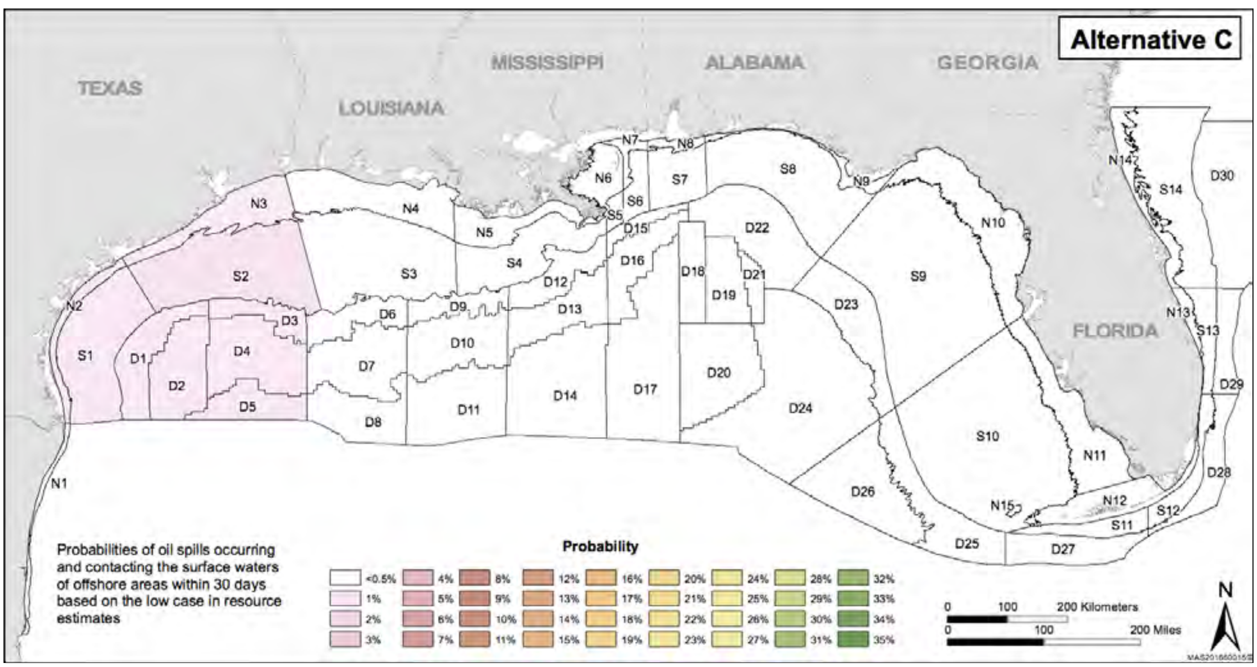

Figure E-18. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 30 Days Nearshore (“N”, 0-20 m), Shelf (“S”, 20-300 m), and Deepwater (“D”, 300 m to outer jurisdiction) Polygons as a Result of the Low Case in Resource Estimates for Alternative C.

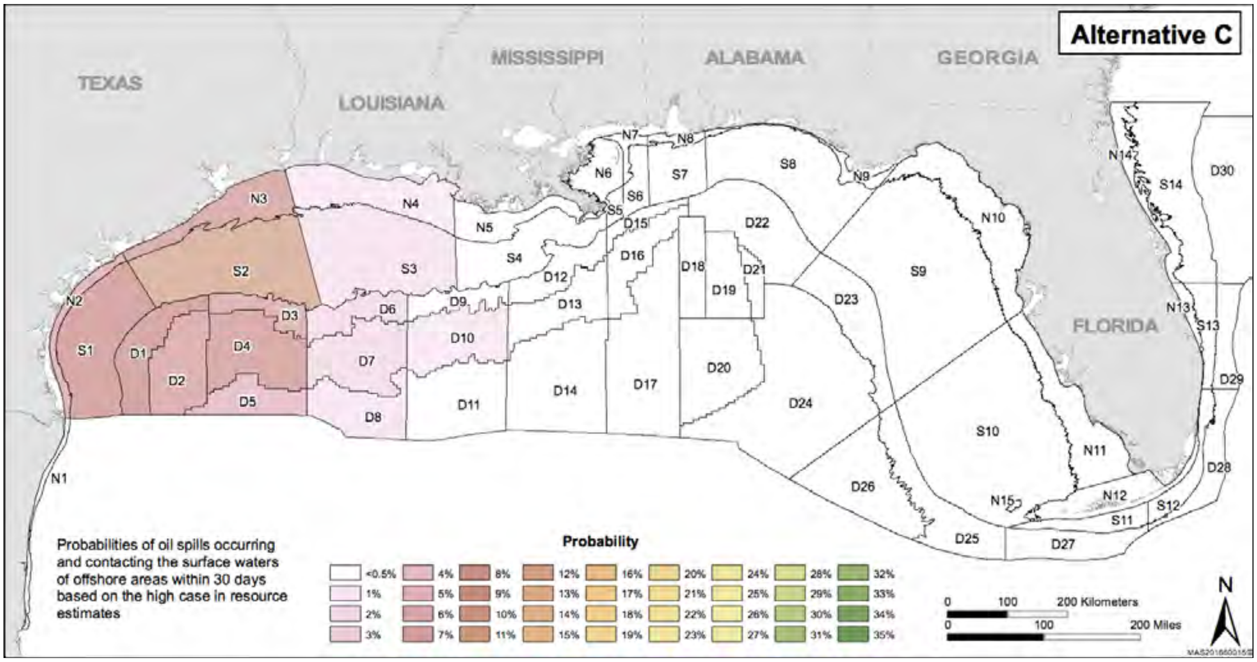

Figure E-19. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 30 Days Nearshore ("N", 0-20 m), Shelf ("S", 20-300 m), and Deepwater ("D", 300 m to outer jurisdiction) Polygons as a Result of the High Case in Resource Estimates for Alternative C.

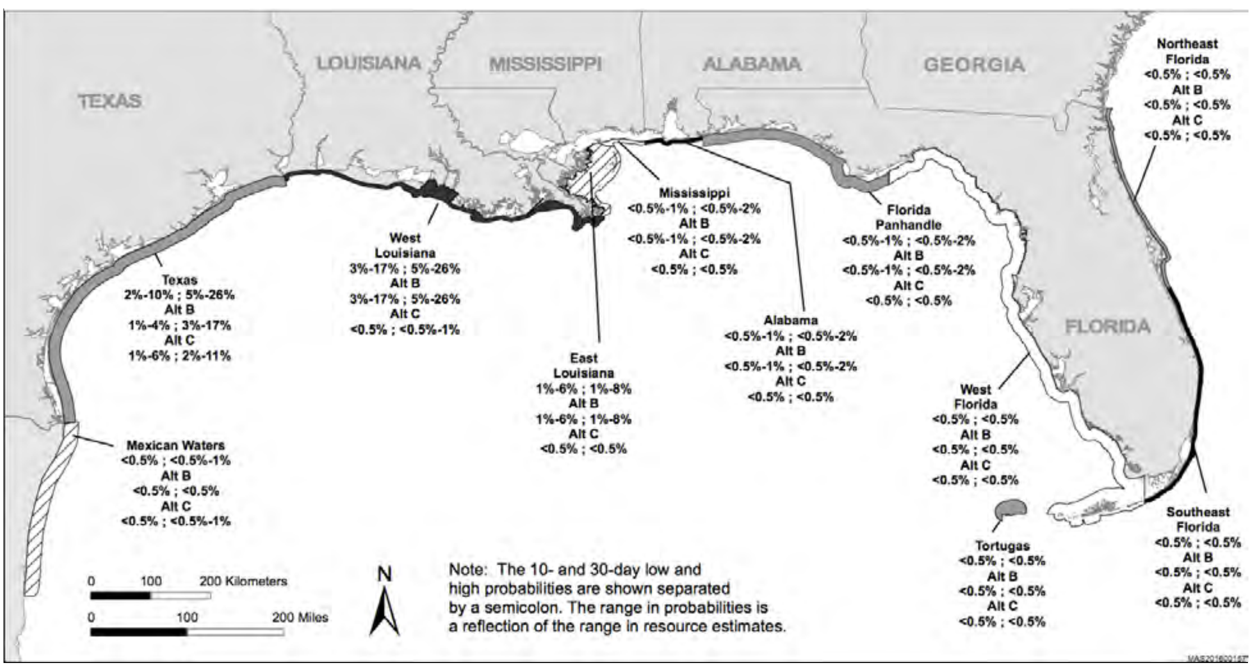

Figure E-20. Probabilities of Oil Spills (≥1,000 bbl) Occurring and Contacting within 10 Days and 30 Days State Offshore Waters as a Result of Alternative A, B, or C. (Note: The limits of State waters are defined by the States and range from 3 to 9 nmi [3.45 to 10.36 mi; 5.56 to 16.67 km]. Texas and Florida State offshore waters extend 3 marine leagues [just over 9 nmi] seaward from the shoreline [1 marine league = 18,228.3 ft; 5,556 m]. Louisiana State offshore waters extend 3 imperial nautical miles seaward of the shoreline [1 imperial nautical mile = 6,080 ft; 1,853 m]).

APPENDIX F

AIR QUALITY:
WRF MODEL PERFORMANCE

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ABBREVIATIONS AND ACRONYMS

ARW	Advanced Research WRF
BOEM	Bureau of Ocean Energy Management
CAI	Climatologically Aided Interpolation
CAAA	Clean Air Act Amendments
CAMx	Comprehensive Air Quality Model with Extensions
CFL	Courant-Friedrichs-Lewy
CFSR	Climate Forecast System Reanalysis
CFSv2	Climate Forecast System Version 2
CMAQ	Community Multi-scale Air Quality model
ECMWF	European Center for Medium-Range Weather Forecasting
EIS	Environmental Impact Statement
ERA	European Center for Medium-Range Weather Forecasting Re-Analysis
ERG	Eastern Research Group, Inc.
ESRL	Earth System Research Laboratory
FDDA	Four-Dimensional Data Assimilation
FNMOC	Fleet Numerical Meteorology and Oceanography Center
IC/BC	Initial Conditions/Boundary Conditions
IOA	Index of Agreement
ISHO	Integrated Surface Hourly Observation
KBRO	Meteorological Call Sign for Brownsville
KSIL	Meteorological Call Sign for Slidell
KTPA	Meteorological Call Sign for Tampa
KEYW	Meteorological Call Sign for Key West
LCC	Lambert Conformal Conic
LSM	Land-Surface Model
MADIS	Meteorological Assimilation Data Ingest System
METSTAT	Meteorological Statistical Program
MM5	Mesoscale Meteorological Model version 5
MMIF	Mesoscale Model Interface Program
MPE	Model Performance Evaluation
NAAQS	National Ambient Air Quality Standards
NAM	North American Model
NASA	National Aeronautics and Space Administration
NCAR	National Center for Atmospheric Research
NCDC	National Climatic Data Center
NCEP	National Centers for Environmental Prediction
NDBC	National Data Buoy Center
NEPA	National Environmental Policy Act
NMM	Nonhydrostatic Mesoscale Model

NOAA	National Oceanographic Atmospheric Administration
NWS	National Weather Service
OCS	Outer Continental Shelf
OCSLA	OCS Lands Act
PBL	Planetary Boundary Layer
PGM	Photochemical Grid Model
PRISM	Parameter-elevation Regressions on Independent Slopes Model
RMSE	Root Mean Square Error
RRTMG	Rapid Radiative Transfer Model for GCMs
SCAS-OSU	Spatial Climate Analysis Service at Oregon State University
SST	Sea-Surface Temperature
TRMM	Tropical Rainfall Measurement Mission
USEPA	United States Environmental Protection Agency
USDOC	United States Department of Commerce
USGS	United States Geological Survey
UTC	Universal Time Coordinate
WPS	WRF Pre-processing System
WRAP	Western Regional Air Partnership
WRF	Weather Research and Forecasting model

F AIR QUALITY: WRF MODEL PERFORMANCE

F.1 INTRODUCTION

The U.S. Department of the Interior's Bureau of Ocean Energy Management (BOEM) is required under the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. § 1334(a)(8)) to comply with the National Ambient Air Quality Standards (NAAQS) to the extent that Outer Continental Shelf (OCS) offshore oil and gas exploration, development, and production sources do not significantly affect the air quality of any state. The Gulf of Mexico OCS Region's area of possible influence includes the States of Texas, Louisiana, Mississippi, Alabama, and Florida. BOEM's Gulf of Mexico Region manages the responsible development of oil, gas, and mineral resources for the 430 million acres in the Western, Central, and Eastern Planning Areas on the OCS, including the areas under moratoria (shown in **Figure F-1**). The Clean Air Act Amendments (CAAA) of 1990 designate air quality authorities, giving BOEM air quality jurisdiction westward of 87°30'W. longitude and the U.S. Environmental Protection Agency (USEPA) air quality jurisdiction eastward of 87°30'W. longitude. In 2006, oil and gas leasing operations within 125 miles (201 kilometers [km]) of the Florida coastline were banned until 2022 under the Gulf of Mexico Energy Security Act (GOMESA). The GOMESA moratoria area is depicted on **Figure F-1**.

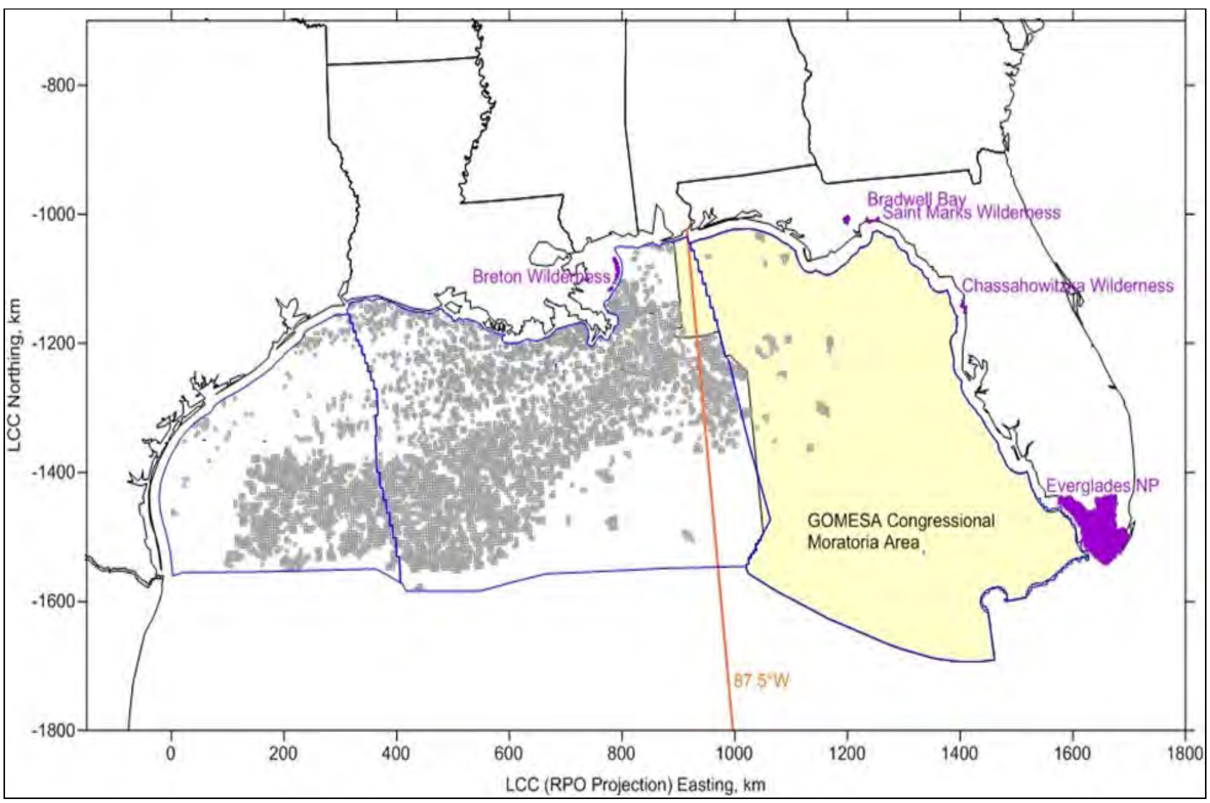


Figure F-1. Location of the "Air Quality Modeling in the Gulf of Mexico Region" Study with Class I Areas (purple) and Platform Locations (gray dots).

The USEPA has set NAAQS for six regulated air quality pollutants: ozone; particulate matter with an aerodynamic diameter of 2.5 micrometers and smaller ($PM_{2.5}$); particulate matter with an aerodynamic diameter of 10 micrometers and smaller (PM_{10}); sulfur dioxide (SO_2); nitrogen dioxide (NO_2); carbon monoxide (CO); and lead (Pb). After promulgation of a NAAQS, the USEPA designates areas that fail to achieve the NAAQS as nonattainment areas (NAAs) and States are required to submit State Implementation Plans (SIPs) to the USEPA that contain emission control plans and a demonstration that the NAA will achieve the NAAQS by the required date. After an area comes into attainment of the NAAQS, the area can be redesignated as a maintenance area and must continue to demonstrate compliance with the NAAQS.

In 1997, the USEPA promulgated the first 8-hour ozone NAAQS with a threshold of 0.08 parts per million (ppm) (84 parts per billion [ppb]). On March 12, 2008, the USEPA promulgated a more stringent 0.075 ppm (75 ppb) 8-hour ozone NAAQS. **Figure F-2** presents the current ozone nonattainment areas in the southeastern U.S. On October 1, 2015, the USEPA strengthened the 8-hour NAAQS for ozone to 0.07 ppm (70 ppb). Under this more stringent ozone NAAQS, there may be more areas in the southeastern U.S. that will be in nonattainment. The USEPA plans to make attainment and nonattainment designations for the revised standards by October 2017, with the designations based on 2014-2016 air quality data.

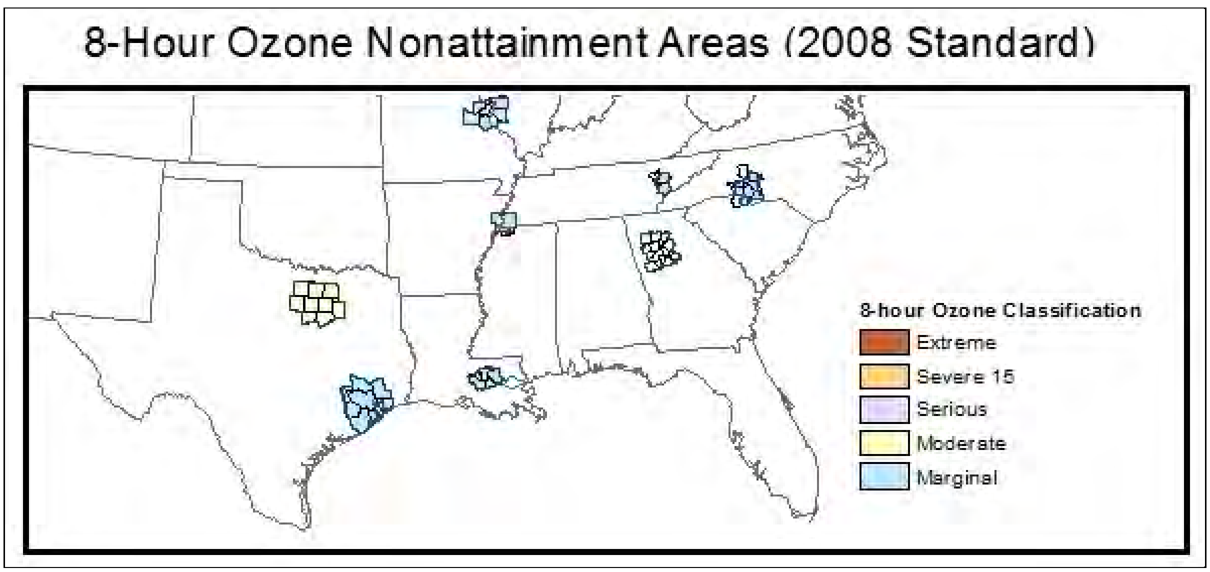


Figure F-2. Ozone Nonattainment Areas in the Southeastern U.S. (USEPA, 2016a).

On December 14, 2012, the USEPA revised the $PM_{2.5}$ primary NAAQS by lowering the annual $PM_{2.5}$ NAAQS threshold from 15.0 micrograms per cubic meter ($\mu g/m^3$) to 12.0 $\mu g/m^3$. The USEPA retained the 24-hour $PM_{2.5}$ primary NAAQS at 35 $\mu g/m^3$. The 24-hour coarse PM NAAQS (PM_{10}) was also retained at 150 $\mu g/m^3$.

In February 2010, the USEPA issued a new 1-hour NO_2 NAAQS with a threshold of 100 ppb (98^{th} percentile daily maximum average over three-years) and a new 1-hour SO_2 NAAQS was promulgated in June 2010 with a threshold of 75 ppb (99^{th} percentile averaged over 3 years). The USEPA has not yet designated the nonattainment areas for the 1-hour NO_2 and 1 hour SO_2 NAAQS.

A new lead NAAQS was issued in 2008; NAAs for lead are associated with specific industrial sources. As oil and gas sources in the Gulf of Mexico OCS region produce negligible amounts of lead emissions and to be consistent with onshore oil and gas analysis, which does not include lead, lead was not included in the air quality analysis. The NAAQS for carbon monoxide has remained essentially unchanged since it was originally promulgated in 1971. As of September 27, 2010, all NAAs for carbon monoxide have been redesignated as maintenance areas. **Table F-1** summarizes the nonattainment and maintenance areas in the southeastern U.S.

Table F-1. Nonattainment and Maintenance Areas in the Southeastern U.S.

State	Area	8-hr O_3 (1997)	8-hr O_3 (2008)	SO_2 (2010)	Lead (2008)
Alabama	Troy, AL				NAA[a]
Florida	Tampa, FL				NAA
	Hillsborough County, FL			NAA	
	Nassau County, FL			NAA	
Louisiana	Baton Rouge, LA	M[b]	NAA		
	St. Bernard Parish, LA			NAA	
Texas	Beaumont-Port Arthur, TX	M			
	Houston-Galveston-Brazoria, TX	NAA	NAA		
	Frisco, TX				NAA

[a] NAA = nonattainment area
[b] M = maintenance area
Blank cells indicate the area is in attainment of the NAAQS.

The CAAA designated 156 Class I areas consisting of National Parks and Wilderness Areas that are offered special protection for air quality and air quality-related values (AQRVs). The Class I areas, compared to Class II areas, have lower Prevention of Significant Deterioration (PSD) air quality increments that new sources may not exceed and are protected against excessive increases in several AQRVs, including visibility impairment, acid (sulfur and nitrogen) deposition, and nitrogen eutrophication. The Regional Haze Rule (RHR) has a goal of natural visibility conditions by 2064 at Class I areas, and States must submit RHR SIPs that demonstrate progress towards that goal. **Figure F-1** displays the locations of the mandatory Class I areas (in purple) in the Gulf of Mexico OCS region. In addition to the Class I areas, Federal Land Management (FLM) agencies have designated certain other areas as sensitive Class II areas for tracking PSD increment consumption and AQRV impacts.

On August 26, 2014, BOEM contracted with Eastern Research Group, Inc. (ERG) and team members Ramboll Environ US Corporation (Ramboll Environ) and Alpine Geophysics, LLC to complete a comprehensive air quality modeling study in the Gulf of Mexico OCS region. Under BOEM Contract Number M14PC00007, air quality photochemical grid modeling (PGM) will be conducted in the region to assess the impacts to nearby States of OCS oil and gas exploration, development, and production as required under OCSLA. This assessment is used by BOEM in the cumulative and visibility impacts analyses of the National Environmental Policy Act (NEPA) environmental impact statement (EIS), which is the *Gulf of Mexico OCS Oil and Gas Lease Sales: 2017-2022; Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261—Final Multisale Environmental Impact Statement* (2017-2022 GOM Multisale EIS). These analyses address both current and proposed NAAQS.

Air quality modeling requires several input datasets, including meteorology, emissions inventories, and ambient pollutant concentrations. **Figure F-3** presents an overview of how these project datasets fit together for the "Air Quality Modeling in the Gulf of Mexico Region" study.

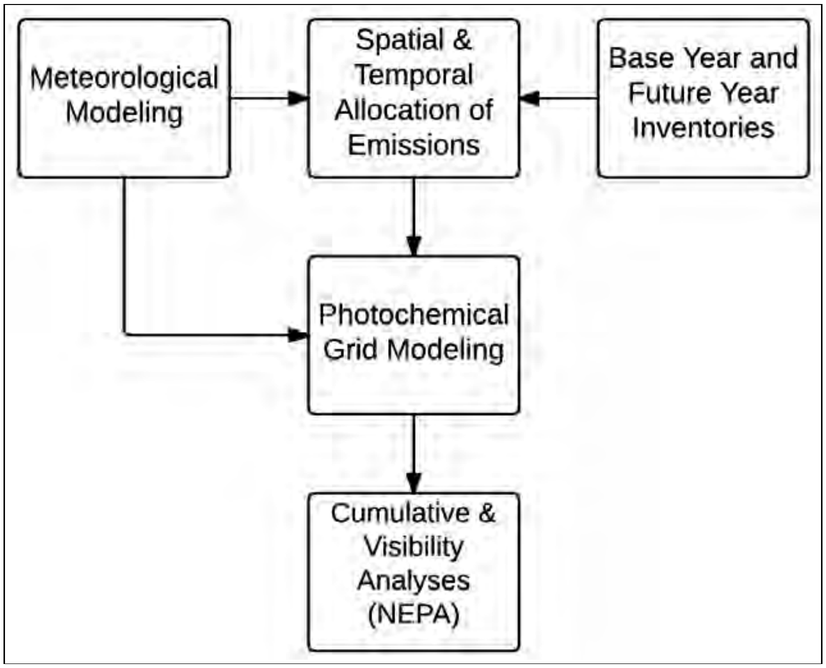


Figure F-3. Overview of the "Air Quality Modeling in the Gulf of Mexico Region" Study Tasks.

This report details the meteorological modeling performance evaluation (MPE) of a Weather and Research Forecast (WRF) model for 2012, the PGM year. A separate report (referred to herein as the "full WRF modeling report") will provide a more comprehensive evaluation of the full 5-year WRF dataset.

Meteorological information is needed for air quality modeling. Parameters such as wind speed, wind direction, air temperature, and humidity are required by models to determine the rate that pollutants disperse and react in the atmosphere. Sources of meteorological information include datasets of measurements gathered at various locations within the Gulf of Mexico OCS Region's domain. However, the spatial coverage of measurements is insufficient to describe the three-dimensional structure of the atmosphere away from measurement locations. Using measurement data as inputs, gridded meteorological models capable of simulating the fluid dynamics of the atmospheric data can be used to estimate meteorological conditions over a complete modeling domain—including regions far from measurement sites—in a physically consistent fashion. The results of these models are often used to establish conditions near remote pollutant sources or remote locations downwind of pollutant sources. Within the domain of the Gulf of Mexico OCS Region, the WRF meteorological model has been identified and was used to provide meteorological inputs for the air quality models.

Ramboll Environ previously evaluated the existing meteorological datasets and concluded that enough deficiencies were present in the datasets and there were not enough positive attributes to select any of them for air quality modeling in the study area (Brashers et al., official communication, 2014) and, therefore, new meteorological modeling was required. One purpose of the modeling is to provide the meteorological dataset for the 2012 simulation using PGM modeling in the OCS region.

F.2 WRF MODELING METHODOLOGY

Over the past decade, emergent requirements for numerical simulation of urban and regional scale air quality have led to intensified efforts to construct high-resolution emissions, meteorological and air quality datasets. It is now possible, for example, to exercise sophisticated mesoscale prognostic meteorological models and Eulerian and Lagrangian photochemical/aerosol models for multi-seasonal periods over near-continental scale domains in a matter of weeks with the application tailored to a specific air quality modeling project.

The WRF model is the current preferred model for atmospheric research and operational forecasting needs at mesoscale resolution (approximately 5 to several hundred km). The model is the state-of-the-art atmospheric simulation system, commonly used to drive air quality dispersion models on the regional level.

The operational version of the model is the Nonhydrostatic Mesoscale Model (NMM) WRF core version 3, developed and maintained by the U.S. Department of Commerce’s National Oceanic and Atmospheric Administration (NOAA) and the National Centers for Environmental Prediction (NCEP). The Advanced Research WRF (ARW) core, currently version WRF 3.7.1, is supported by the National Center for Atmospheric Research (NCAR), Mesoscale and Microscale Meteorology Division (NCAR, 2015). The modeling described in this report used WRF version 3.7.

The WRF model contains separate modules to compute different physical processes such as surface energy budgets and soil interactions, turbulence, cloud microphysics, and atmospheric radiation. Within WRF, the user has many options for selecting the different schemes for each type of physical process. There is a WRF Pre-processing System (WPS) that generates the initial and boundary conditions used by WRF, based on topographic datasets, land use information, and larger-scale atmospheric and oceanic models.

F.2.1 Gulf of Mexico Region Air Quality Meteorological Modeling

The USEPA CONUS WRF and Ramboll Environ Training WRF datasets were previously examined in detail and evaluated using both quantitative and qualitative techniques. Both datasets were identified as being inadequate for the study area, particularly in the offshore portions (Brashers et al., official communication, 2014). The development of a new high-resolution dataset was necessary to more accurately represent meteorological conditions in the over-water portions of the OCS region for use in air quality modeling.

F.2.2 Model Domain Configuration

The WRF domain configuration is comprised of a system of simultaneous nested grids. **Figure F-3** shows the WRF modeling grids at 36/12/4 km. All WRF grids are defined on a Lambert Conformal Conic (LCC) projection centered at 40°N. latitude, 97°W. longitude with true latitudes at 33°N. and 45°N. (the “standard RPO” projection). The outermost domain (outer box) with 36-km resolution includes the entire continental U.S. and parts of Canada and Mexico, and captures synoptic-scale (storm system-scale) structures in the atmosphere. The inner 12-km regional grid (d02) covers the southeastern U.S. and was used to ensure that large-scale meteorological patterns across the region are adequately represented and to provide boundary conditions to the 4-km domain.

The 4-km domain (d03) shown in **Figure F-4** is centered on the coastal areas of the southeastern U.S. and over-water portions of the Gulf of Mexico. **Table F-2** provides the input configurations for this WRF domain. The NX and NY are the number of east-west and north-south staggered grid points, respectively, in each domain. I-start and J-start indicate the western and southern nested grid starting indices with respect to the parent grid. Geographic resolution relates to the geographic datasets employed for each grid in terms of minutes or seconds of degrees.

The 36-, 12-, and 4-km grids were run simultaneously with one-way nesting, meaning that meteorological information flows down-scale via boundary conditions introduced from the coarser to finer grids without feedback from the finer to coarser grids. The WRF modeling domain was defined to be slightly larger than the CAMx/CMAQ PGM modeling domains to eliminate boundary artifacts in the meteorological fields. Such boundary artifacts occur for both numerical reason (the 3:1 grid spacing ratio) and because the imposed boundary conditions require some time/space to come into dynamic balance with WRF’s atmospheric equations.

Table F-2. BOEM’s Gulf of Mexico OCS Region WRF Domain Configuration.

Grid Resolution	NX	NY	I-start	J-start	Geographic Resolution	Coverage
36 km	165	129	1	1	10 minute	CONUS
12 km	265	187	55	9	2 minute	SE CONUS
4 km	481	211	72	27	30 second	OCS Region

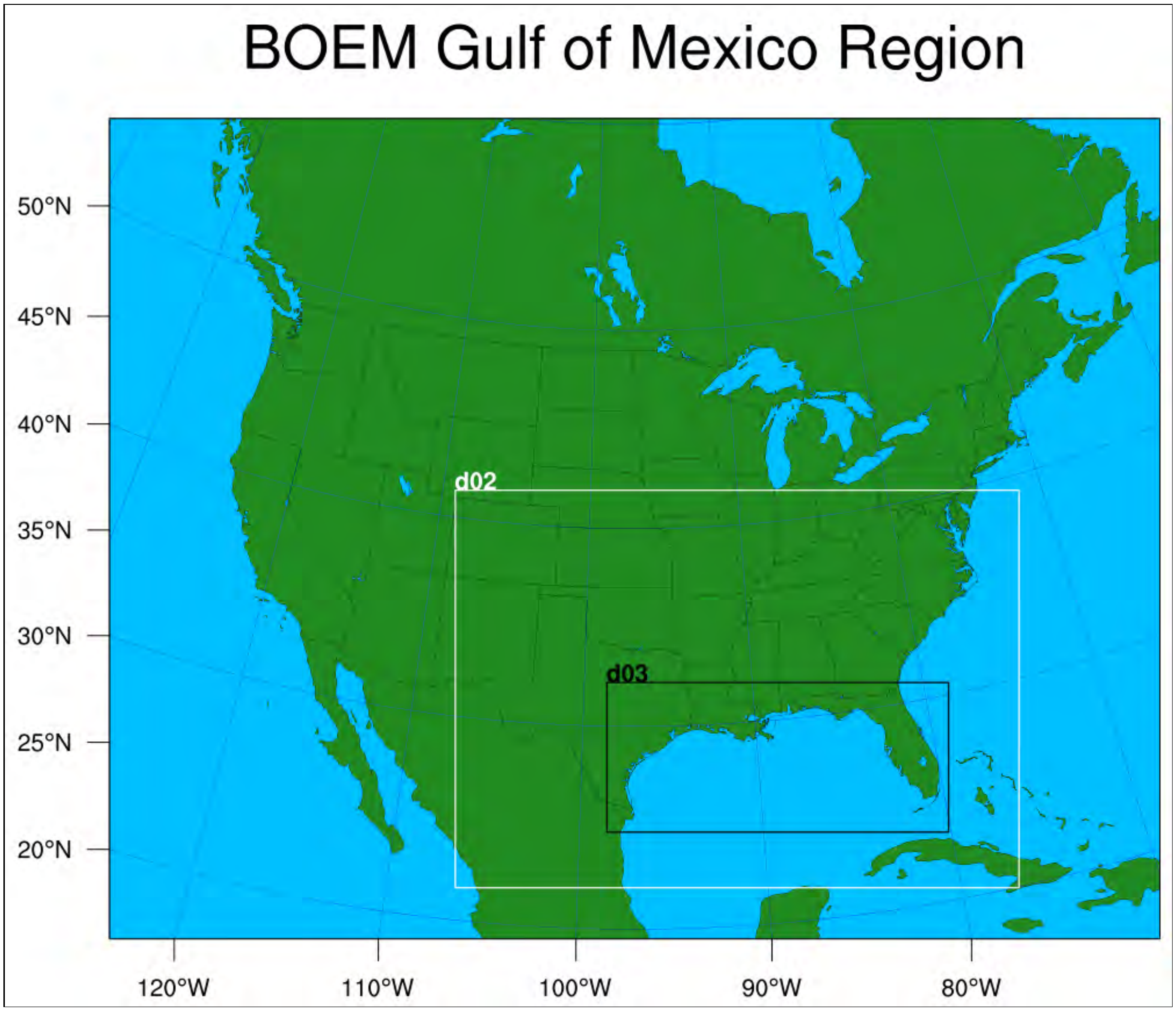


Figure F-4. WRF 36-km CONUS (d01), 12-km SE Regional (d02), and 4-km Gulf of Mexico Region (d03) Domains.

F.2.3 Model Application

The publicly available version of WRF, version 3.7, was used in the Gulf of Mexico OCS Region's meteorological modeling. The WRF pre-processor programs, including GEOGRID, UNGRIB, METGRID, and OBSGRID, were used to develop model inputs.

F.2.3.1 Model Vertical Resolution

The dataset was tested using both 33 and 37 vertical layers. Thirty-seven vertical layers allowed for higher vertical resolutions near the surface, which enabled the model to more accurately capture low-level inversions frequently present during winter. Additional layers in the mid-levels also allowed the model to more accurately re-create the convective updraft velocities seen in the summer months. The dataset model levels are shown in **Table F-3**.

Table F-3. BOEM Gulf of Mexico OCS Region WRF Dataset Model Levels.

Level	eta	Pressure (mb)	Height (m)	Mid Height (m)	Thickness (m)
0	1	1,000	0.0		
1	0.9985	999	12.2	6.1	12.2
2	0.9970	997	24.5	18.4	12.2
3	0.9950	995	40.8	32.7	16.4
4	0.9930	993	57.2	49.0	16.4
5	0.9910	991	73.6	65.4	16.4
6	0.9880	989	98.3	85.9	24.7
7	0.9850	986	123.0	110.6	24.7
8	0.9800	981	164.3	143.6	41.3
9	0.9700	972	247.4	205.9	83.1
10	0.9600	962	331.2	289.3	83.8
11	0.9500	953	415.7	373.4	84.5
12	0.9400	943	500.8	458.2	85.1
13	0.9300	934	586.6	543.7	85.8
14	0.9100	915	760.5	673.5	173.8
15	0.8900	896	937.2	848.8	176.8
16	0.8700	877	1,117.1	1,027.1	179.8
17	0.8400	848	1,392.8	1,254.9	275.8
18	0.8000	810	1,772.4	1,582.6	379.6
19	0.7600	772	2,166.7	1,969.6	394.3
20	0.7200	734	2,577.0	2,371.9	410.3
21	0.6800	696	3,005.0	2,791.0	427.9
22	0.6400	658	3,452.2	3,228.6	447.3
23	0.6000	620	3,921.0	3,686.6	468.7
24	0.5500	573	4,540.7	4,230.8	619.8
25	0.5000	525	5,203.7	4,872.2	662.9
26	0.4500	478	5,917.1	5,560.4	713.4
27	0.4000	430	6,690.5	6,303.8	773.4
28	0.3500	383	7,536.4	7,113.5	846.0
29	0.3000	335	8,472.3	8,004.4	935.8
30	0.2500	288	9,522.5	8,997.4	1,050.2
31	0.2000	240	10,724.1	10,123.3	1,201.6
32	0.1500	193	12,136.7	11,430.4	1,412.6
33	0.1000	145	13,866.9	13,001.8	1,730.1
34	0.0600	107	15,621.6	14,744.2	1,754.7
35	0.0270	76	17,503.4	16,562.5	1,881.8
36	0.0000	50	19,594.2	18,548.8	2,090.8

F.2.3.2 Topographic Inputs

Topographic information for WRF was developed using the standard WRF terrain databases available from NCAR. The 36-km CONUS domain was based on the 10-min (18-km) global data. The 12-km southeastern CONUS domain was based on the 2 min (~4-km) data. The 4-km Gulf of Mexico OCS region domain was based on the 30-sec (~900-m) data.

F.2.3.3 Vegetation Type and Land Use Inputs

Vegetation type and land-use information was developed using the U.S. Department of the Interior, Geological Survey (USGS) land-use database from the most recently released WRF databases provided with the WRF distribution. The number of land categories in input data was the USGS default of 24. Standard WRF surface characteristics corresponding to each land-use category were employed.

F.2.3.4 Atmospheric Data Inputs

The WRF relies on some other model or re-analysis output to provide initial and boundary conditions (IC/BC). Sensitivity tests were performed on several datasets to evaluate their effectiveness over the Gulf of Mexico. The datasets tested include the ERA-Interim reanalysis product, available from the European Center for Medium-range Weather Forecasting (ECMWF) Data Portal website; the Climate Forecast System Reanalysis (CFSR, ended in 2010), and the Climate Forecast System model version 2 (CFSv2, after 2010) (Saha et al., 2014); and the 12-km North American Model (NAM) archives available from the National Climatic Data Center (NCDC) NOMADS server.

The NAM dataset was chosen for the lowest bias and error in model performance and was used as first guess fields for WRF. This dataset was objectively re-analyzed using traditional observation site data (meteorological towers) to the higher resolution of each WRF grid, using the OBSGRID program. These fields are then used both to initialize the model and to conduct analysis nudging to guide the model to best match the observations.

F.2.3.5 Time Integration

Adaptive time stepping was used to maximize the time step that the model can use while keeping the model numerically stable. The model time step was adjusted based on the domain-wide horizontal and vertical stability Courant-Friedrichs-Lewy (CFL) target value of 0.8.

F.2.3.6 Diffusion Options

Horizontal Smagorinsky first-order closure (km_opt = 4) with sixth-order numerical diffusion and suppressed up-gradient diffusion (diff_6th_opt = 2) was used.

F.2.3.7 Lateral Boundary Conditions

Lateral boundary conditions were specified from the initialization dataset on the 36-km domain with continuous updates nested from the 36-km domain to the 12-km domain and from the 12-km domain to the 4-km domain, using one-way nesting (feedback = 0).

F.2.3.8 Top and Bottom Boundary Conditions

The top boundary condition was selected as an implicit Rayleigh dampening for the vertical velocity. Consistent with the model application for non-idealized cases, the bottom boundary condition was selected as physical, not free-slip.

F.2.3.9 Sea-Surface Temperature Inputs

High-resolution, sea-surface temperature (SST) inputs aid in improving meteorological conditions for the over-water portions of the Gulf of Mexico OCS region. The Fleet Numerical Meteorology and Oceanography Center (FNMOC) dataset, available from the Global Ocean Data Assimilation Experiment (GODAE) archives, was selected after extensive testing of several SST databases. The FNMOC high-resolution database is updated every 6 hours using satellite-derived (AVHRR) SST and in-situ SST from ships and buoys with resolutions, ranging from 12 km at the equator to 9 km at the mid-latitudes. The FNMOC SST database was chosen for the lowest SST bias and error in model performance evaluation tests, which used open water observations from the National Data Buoy Center (NDBC) archives.

F.2.3.10 FDDA Data Assimilation

The WRF was created as a forecast tool, but it can also be applied in "hindcast" mode. In forecast mode, the initial conditions for a run might be the most recent analysis (a gridded version of the current state of the atmosphere). In hindcast mode, we know the state of the atmosphere both at the beginning and end of (and during) the WRF run. Using these 6-hourly analyses, an extra error term is introduced into the WRF equations, nudging the WRF atmosphere toward the real atmosphere. This is known as Four Dimensional Data Assimilation (FDDA) or analysis nudging and is applied to every grid cell in the domain. It works best at larger grid spacing scales and for larger domains.

Observational nudging is the process of nudging just the single grid cell toward a single-point observation. The observation could be taken at a traditional meteorological tower or by a weather balloon or other non-traditional sources. Observation nudging works best at finer grid spacing scales and could have been performed on higher resolution domains using the Meteorological Assimilation Data Ingest System (MADIS) observation archive.

The WRF model was run with analysis nudging and no observation nudging. For winds and temperature, analysis nudging coefficients of $5x10^{-4}$ and $3.0x10^{-4}$ were used on the 36- and 12-km domains, respectively. For mixing ratio, an analysis nudging coefficient of $1.0x10^{-5}$ was used for both the 36- and 12-km domains. Analysis nudging of winds was applied both at near the surface and aloft, but nudging for temperature and mixing ratio was not performed in the lower atmosphere (i.e., within the boundary layer).

Significant sensitivity testing was used to evaluate impacts of observational nudging on the 4-km domain. The observational nudging coefficients for winds were tested at values set from 0 to

1.2×10^{-3} with a radius of influence at 50 km. Ramboll Environ concluded that any observational nudging coefficient for winds above zero caused excessive convection in the offshore portions of the Gulf of Mexico, resulting in an extreme overstatement of precipitation. Additionally, humidity nudging was tested at values ranging from 0 to 1.0×10^{-5}. The lower nudging values also prevented excess moisture in the model, primarily through the summer months. Setting wind, temperature, and moisture coefficients all to zero produced the most accurate precipitation results and are very similar to the nudging used in the USEPA 2011 CONUS WRF dataset (Gilliam and Pleim, 2010).

F.2.3.11 WRF Physics Options

The WRF model contains many different physics options. Model tests for the months of January and July 2012 were performed to evaluate various cumulus parameterizations, times between radiation physics calls, and land surface models to achieve the best WRF performance in the dataset. **Table F-4** lists the BOEM Gulf of Mexico OCS Region WRF physics options.

Table F-4. BOEM Gulf of Mexico OCS Region WRF Physics Options.

Option	Scheme	Notes
Microphysics	Thompson	State-of-the-art microphysics model
Longwave Radiation	RRTMG	Rapid Radiative Transfer Model for GCMs includes random cloud overlap and improved efficiency over RRTM.
Shortwave Radiation	RRTMG	Same as above, but for shortwave radiation.
Land Surface Model (LSM)	Noah	Four-layer scheme with vegetation and sub-grid tiling.
Planetary Boundary Layer (PBL) scheme	YSU	Yonsie University (Korea) Asymmetric Convective Model with non-local upward mixing and local downward mixing.
Cumulus Parameterization	Kain-Fritsch in the 36-km and 12-km domains.	Deep and shallow convection sub-grid scheme using a mass flux approach with downdrafts and CAPE removal time scale.
Analysis Nudging	Nudging applied to winds, temperature and moisture in the 36-km and 12-km domains.	Temperature and moisture nudged above PBL only.
Observation Nudging	No nudging applied	Surface wind and moisture observational nudging can induce excessive convection, leading to increased rainfall.
Surface Layer	Revised MM5 Monin-Obukhov scheme	In conjunction with YSU PBL scheme.

F.2.3.12 WRF Application Methodology

The WRF model was executed in 5-day blocks initialized at 12Z every 5 days for calendar year 2012. Model results are output every 60 minutes and output files are split at 12-hour intervals. Twelve (12) hours of spin-up were included in each 5-day block before the data were used in the subsequent evaluation.

F.3 WRF MODEL PERFORMANCE EVALUATION RESULTS

A quantitative and qualitative evaluation of the BOEM Gulf of Mexico OCS Region WRF simulation was conducted. The quantitative evaluation compared integrated surface hourly meteorological observations and offshore buoy observations with WRF predictions matched by time and location. The qualitative evaluation compared twice daily vertical profiles with upper-air data with WRF predictions matched by time and location and wind roses of coastal sites. Additionally, monthly and daily total spatial precipitation fields based on observations and satellite were compared with the WRF gridded monthly and daily total precipitation fields. Below, we summarize the main features of the WRF simulation model performance evaluation.

F.3.1 Quantitative Evaluation Using Metstat

A quantitative model performance evaluation of the BOEM Gulf of Mexico OCS Region WRF simulation was performed using integrated hourly surface and on-site meteorological measurements and the publicly available METSTAT software (Ramboll Environ, 2015) evaluation tool. METSTAT calculates statistical performance metrics for bias, error and correlation for surface winds, temperature, and mixing ratio (i.e., water vapor or humidity). To evaluate the performance of a meteorological model simulation for air quality model applications, a number of performance benchmarks for comparison are typically used. **Table F-5** lists the meteorological model performance benchmarks for simple (Emery et al., 2001) and complex (Kemball-Cook et al., 2005) situations. The simple benchmarks were developed by analyzing well-performing meteorological model evaluation results for simple, mostly flat terrain conditions and simple meteorological conditions (e.g., stationary high pressure) that were mostly conducted to support air quality modeling studies (e.g., ozone SIP modeling). The complex benchmarks were developed during the Western Regional Air Partnership (WRAP) regional haze modeling and are performance benchmarks for more complex conditions, such as the complex terrain of the Rocky Mountains and Alaska (Kemball-Cook et al., 2005). McNally (2009) analyzed multiple annual runs that included complex terrain conditions and suggested an alternative set of benchmarks for temperature under more complex conditions. The purpose of the benchmarks is to understand how good or poor the results are relative to other model applications run for the U.S.

In this section, Ramboll Environ compare the WRF meteorological variables to the benchmarks as an indication of the BOEM Gulf of Mexico OCS Region WRF model performance. These benchmarks include bias and error in temperature, wind direction, and mixing ratio, as well as the wind speed bias and Root Mean Squared Error (RMSE) between the models and databases.

Table F-5. Meteorological Model Performance Benchmarks for Simple and Complex Conditions.

Parameter	Emery et al. (2001)	Kemball-Cook et al. (2005)	McNally (2009)
Conditions	Simple	Complex	Both
Temperature Bias	≤ ±0.5 K	≤ ±2.0 K	≤ ±1.0 K
Temperature Error	≤ 2.0 K	≤ 3.5 K	≤ 3.0 K
Temperature IOA	≥ 0.8	(not addressed)	(not addressed)
Humidity Bias	≤ ±1.0 g/kg	≤ ±0.8 g/kg	≤ ±1.0 g/kg

Parameter	Emery et al. (2001)	Kemball-Cook et al. (2005)	McNally (2009)
Humidity Error	≤ 2.0 g/kg	≤ 2.0 g/kg	≤ 2.0 g/kg
Humidity IOA	≥ 0.6	(not addressed)	(not addressed)
Wind Speed Bias	≤ ±0.5 m/s	≤ ±1.5 m/s	(not addressed)
Wind Speed RMSE	≤ 2.0 m/s	≤ 2.5 m/s	(not addressed)
Wind Speed IOA	≥ 0.6	(not addressed)	(not addressed)
Wind Dir. Bias	≤ ±10 degrees	(not addressed)	(not addressed)
Wind Dir. Error	≤ 30 degrees	≤ 55 degrees	(not addressed)

The output from the BOEM Gulf of Mexico OCS Region WRF simulation was compared against the NCDC's global-scale, quality-controlled DS3505 integrated surface hourly observational (ISHO) data (USDOC, NOAA, NCDC, 2015) and the NDBC's buoy database (USDOC, NOAA, NDBC, 2015) as verification data. Global hourly and synoptic observations are compiled from numerous sources into a single common ASCII format and common data model. The DS3505 database contains records of most official surface meteorological stations from airports, military bases, reservoirs/dams, agricultural sites, and other sources dating from 1901 to the present, and quality control has corrected well over 99% of the errors present in the original data. The NDBC database contains records of moored buoys, coastal-marine automated network stations, and other sources dating from 1970 to the present.

F.3.1.1 Quantitative Statistics

Several statistical measures are calculated as part of the meteorological model evaluation. Additional plots and graphs are used to present these statistics on both hourly and daily timeframes. These measures are calculated for wind speed, wind direction, temperature, and humidity at the surface. The various statistical measures used for this evaluation are described below.

The statistics used to evaluate meteorological model performance are all given in absolute terms (e.g., wind speed error in meters per second [m/s]) rather than in relative terms (percent error) as is commonly shown for air quality assessments. The major reason for this is that a very different significance is associated with a given relative error for different meteorological parameters. For example, a 10 percent error for wind speed measured at 10 m/s is an absolute error of 1 m/s, a minor error. Yet a 10 percent error for temperature at 300 K is an absolute error of 30 K, an unacceptably large error. On the other hand, pollutant concentration errors of 10 percent at 1 ppb or 10 ppm carry practically the same significance.

Statistical Measures

Mean Observation (M_o): Calculated from all sites with valid data within a given analysis region and for a given time period (hourly or daily):

$$M_o = \frac{1}{IJ}\sum_{j=1}^{J}\sum_{i=1}^{I} O_j^i$$

where $O^i j$ is the individual observed quantity at site *i* and time *j*, and the summations are over all sites (I) and over time periods (*J*).

Mean Prediction (M_p): Calculated from simulation results that are interpolated to each observation used to calculate the mean observation (hourly or daily):

$$M_p = \frac{1}{IJ}\sum_{j=1}^{J}\sum_{i=1}^{I} P_j^i$$

where $P^i j$ is the individual predicted quantity at site *i* and time *j*. Note that mean observed and predicted winds are vector-averaged (for east-west component u and north-south component v), from which the mean wind speed and mean resultant direction are derived.

Least Square Regression: Performed to fit the prediction set to a linear model that describes the observation set for all sites with valid data within a given analysis region and for a given time period (daily or episode). The y-intercept a and slope b of the resulting straight line fit is calculated to describe the regressed prediction for each observation:

$$P_j^i = a + bO_j^i$$

The goal is for a 1:1 slope and a "0" y-intercept (no net bias over the entire range of observations), and a regression coefficient of 1 (a perfect regression). The slope and intercept facilitate the calculation of several error and skill statistics described below.

Bias Error (B): Calculated as the mean difference in prediction-observation pairings with valid data within a given analysis region and for a given time period (hourly or daily):

$$B = \frac{1}{IJ}\sum_{j=1}^{J}\sum_{i=1}^{I}\left(P_j^i - O_j^i\right)$$

Gross Error (E): Calculated as the mean absolute difference in prediction-observation pairings with valid data within a given analysis region and for a given time period (hourly or daily):

$$E = \frac{1}{IJ}\sum_{j=1}^{J}\sum_{i=1}^{I}\left|P_j^i - O_j^i\right|$$

Note that the bias and gross error for winds are calculated from the predicted-observed residuals in speed and direction (not from vector components u and v). The direction error for a given prediction-observation pairing is limited to range from 0 to 180.

Root Mean Square Error (RMSE): Calculated as the square root of the mean squared difference in prediction-observation pairings with valid data within a given analysis region and for a given time period (hourly or daily):

$$RMSE = \left[\frac{1}{IJ} \sum_{j=1}^{J} \sum_{i=1}^{I} \left(P_j^i - O_j^i \right)^2 \right]^{1/2}$$

The RMSE, as with the gross error, is a good overall measure of model performance. However, since large errors are weighted heavily (due to squaring), large errors in a small sub-region may produce a large RMSE even though the errors may be small and quite acceptable elsewhere.

It is important that RMSE is analyzed. For example, if only RMSE is estimated (and it appears acceptable), it could consist largely of the systemat¬ic component. This error might be removed through improvements in the model inputs or use of more appropriate options, thereby reducing the error transferred to the photochemical model. On the other hand, if the RMSE consists largely of the unsystematic component, this indicates that further error reduction may require model refinement (new algorithms, higher resolution grids, etc.) or that the phenomena to be replicated cannot be fully addressed by the model. It also provides error bars that may be used with the inputs in subsequent sensitivity analyses.

F.3.1.2 METSTAT Evaluation Using Integrated Surface Hourly Observations and Offshore Buoy Observations

The METSTAT results for 2012 are presented in **Figures F-5 through F-16**. The WRF wind direction performed very well, with the majority of months falling within the simple conditions threshold for all spatial domains (36, 12, and 4 km). For all domains, WRF wind speed, temperature, and humidity also performed very well. For most months, there are slight positive biases in wind speed and humidity in all three spatial domains. Overall, the WRF model performed exceptionally well in the 36- and 12-km domains and well in the 4-km domain for onshore surface wind direction, wind speed, humidity and temperature observation comparisons.

METSTAT was also used to evaluate WRF performance in the innermost 4-km domain using observations from meteorological buoys throughout the Gulf of Mexico for 2012. Overall, WRF wind direction performed well with over half of all months falling with the simple conditions benchmark. Wind speed performance was acceptable with all months falling within the complex conditions benchmark. Temperature bias and error is slightly higher (warmer) in the winter months compared to the summer months, suggesting that the model is over-forecasting surface temperatures, or is an influence from the SST database input to WRF. Humidity performed well with a majority of months, falling within the simple conditions benchmark. In general, the offshore METSTAT evaluation is very similar to the onshore evaluation, suggesting consistent performance over both the land and sea portions of the Gulf of Mexico OCS region.

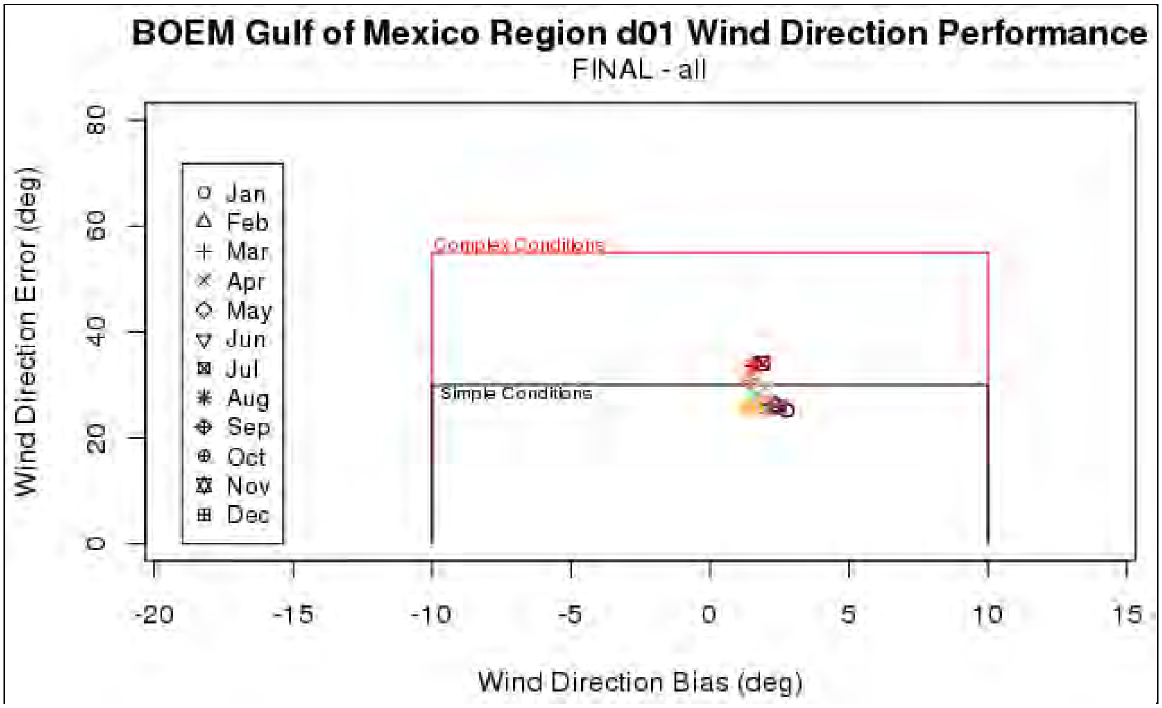


Figure F-5. BOEM Gulf of Mexico OCS Region WRF 36-km METSTAT Wind Direction Performance for 2012.

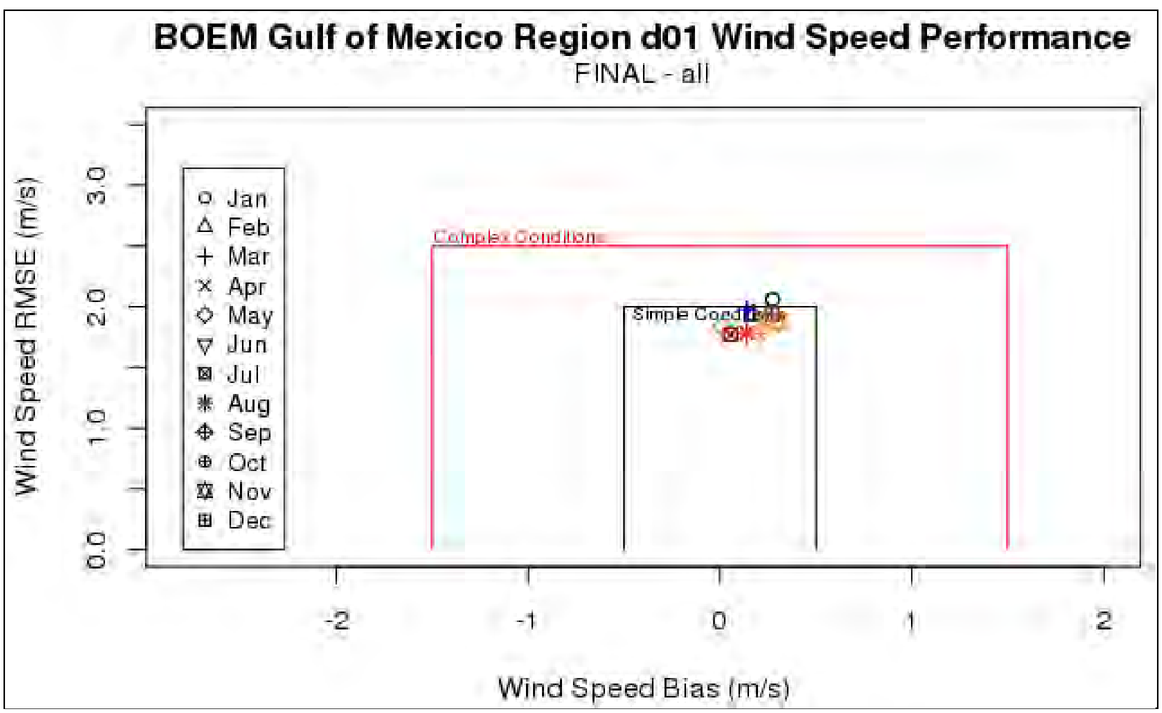


Figure F-6. BOEM Gulf of Mexico OCS Region WRF 36-km METSTAT Wind Speed Performance for 2012.

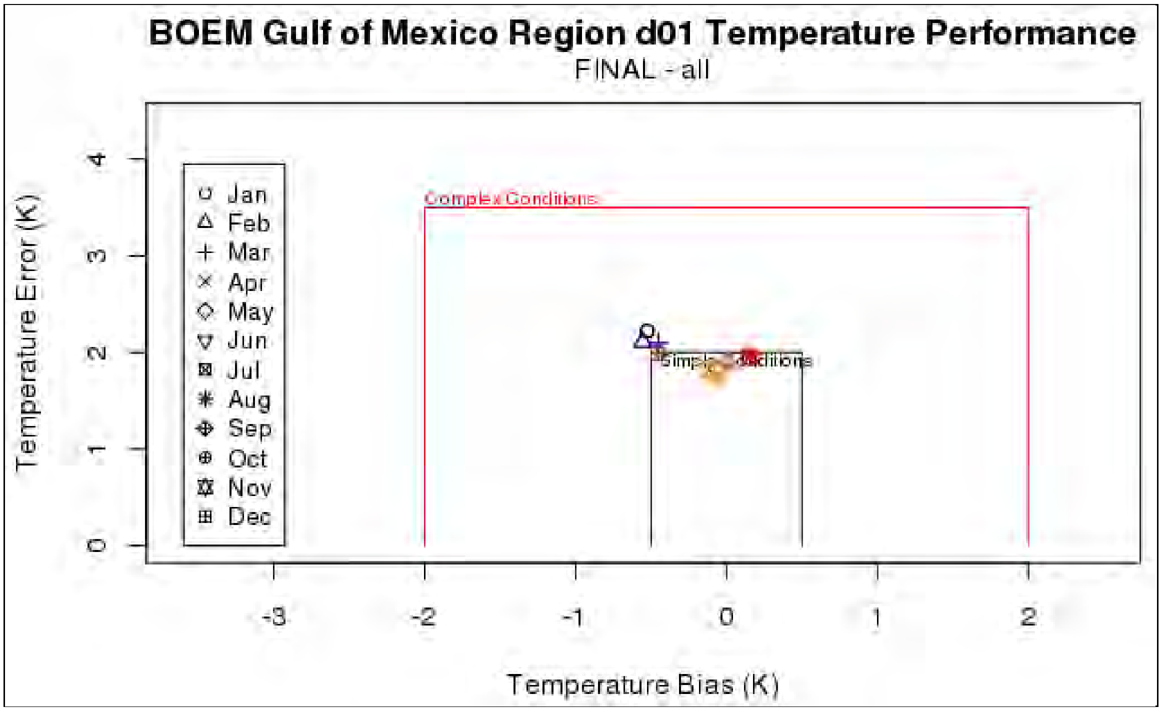


Figure F-7. BOEM Gulfof Mexico OCS Region WRF 36-km METSTAT Temperature Performance for 2012.

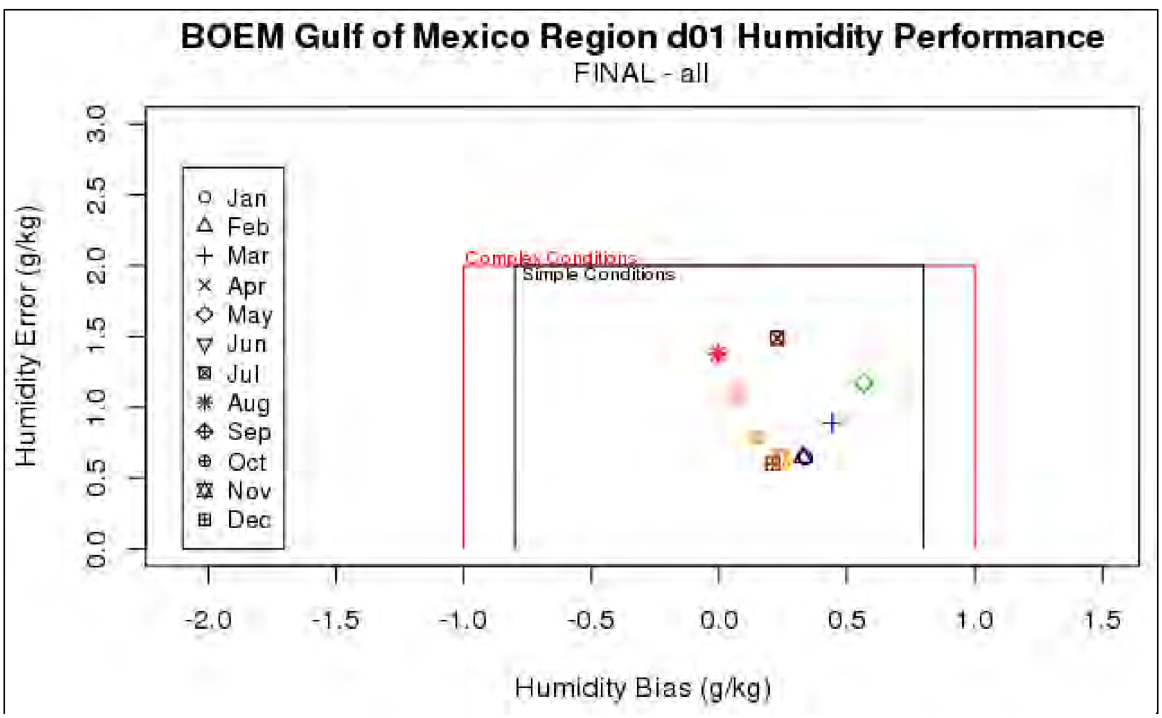


Figure F-8. BOEM Gulf of Mexico OCS Region WRF 36-km METSTAT Humidity Performance for 2012.

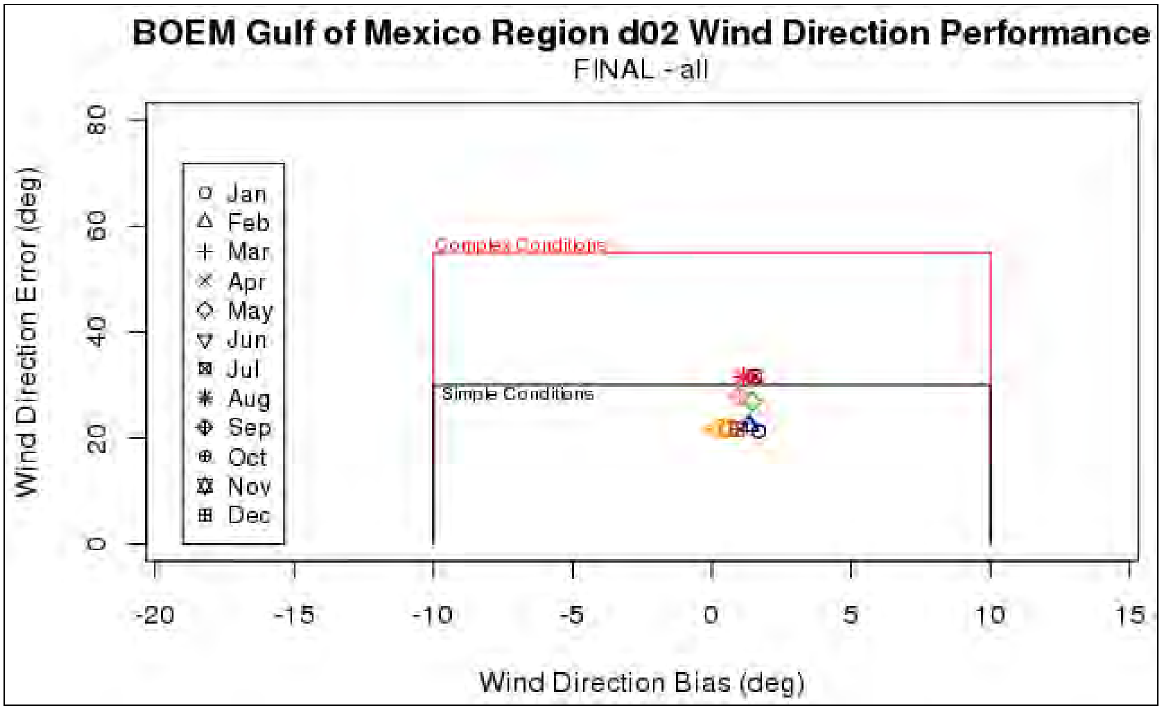


Figure F-9. BOEM Gulf of Mexico OCS Region WRF 12-km METSTAT Wind Direction Performance for 2012.

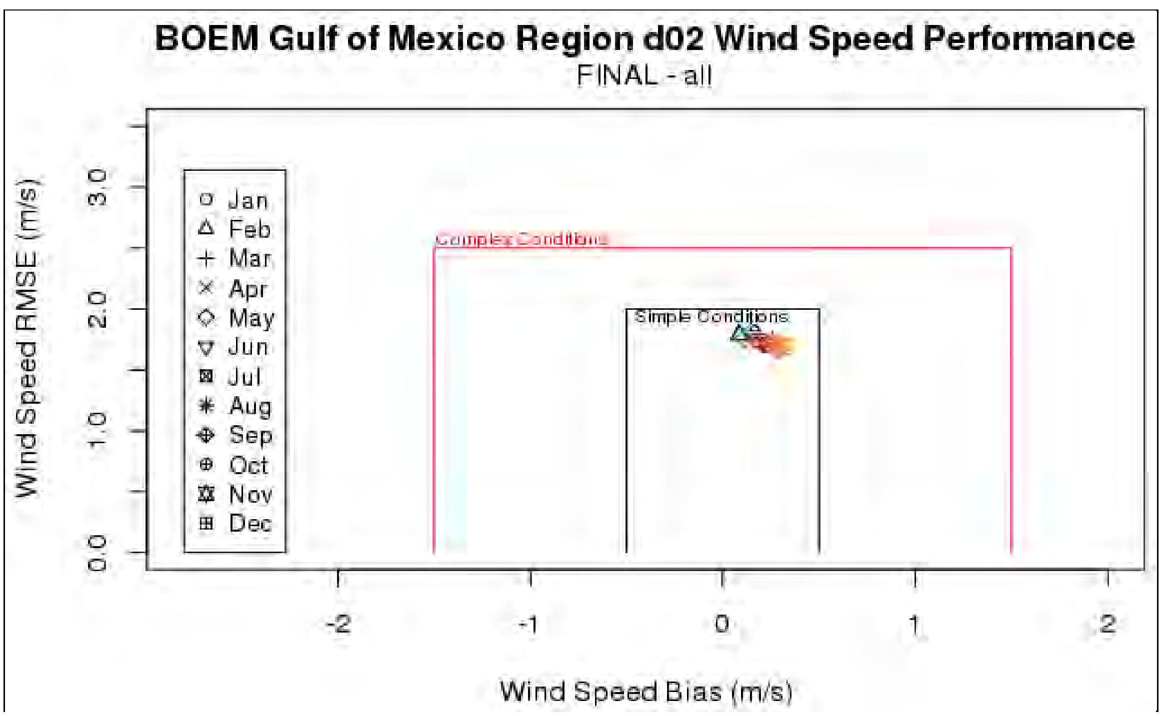


Figure F-10. BOEM Gulf of Mexico OCS Region WRF 12-km METSTAT Wind Speed Performance for 2012.

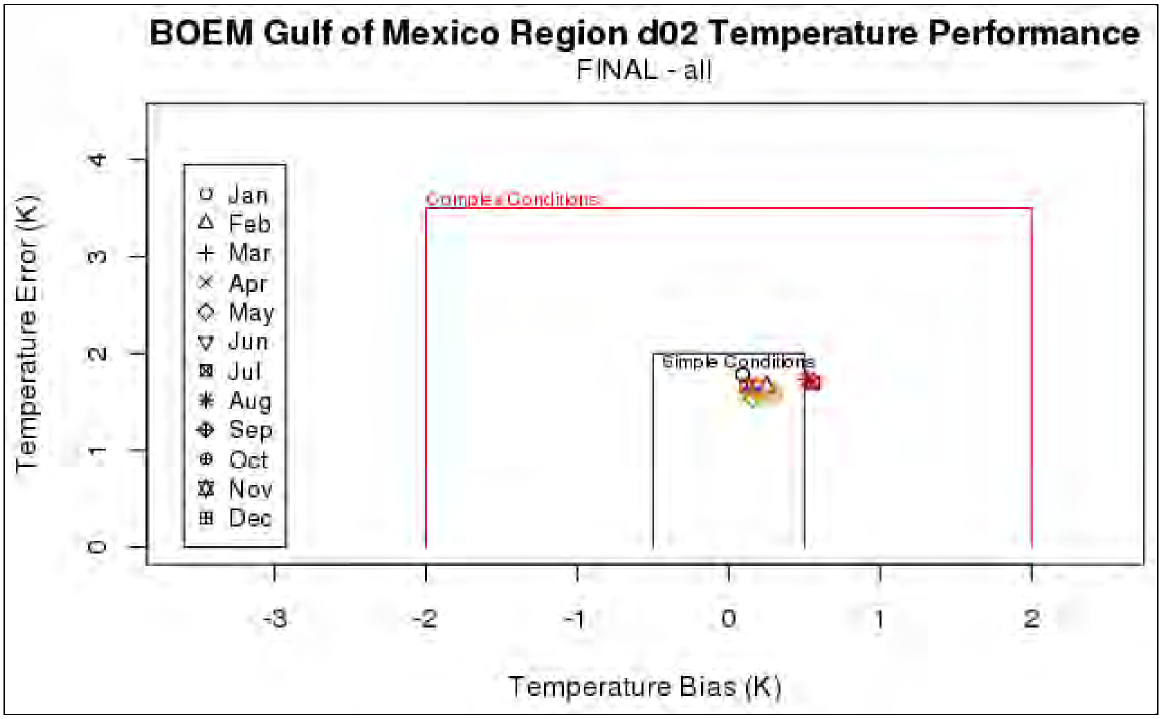


Figure F-11. BOEM Gulf of Mexico OCS Region WRF 12-km METSTAT Temperature Performance for 2012.

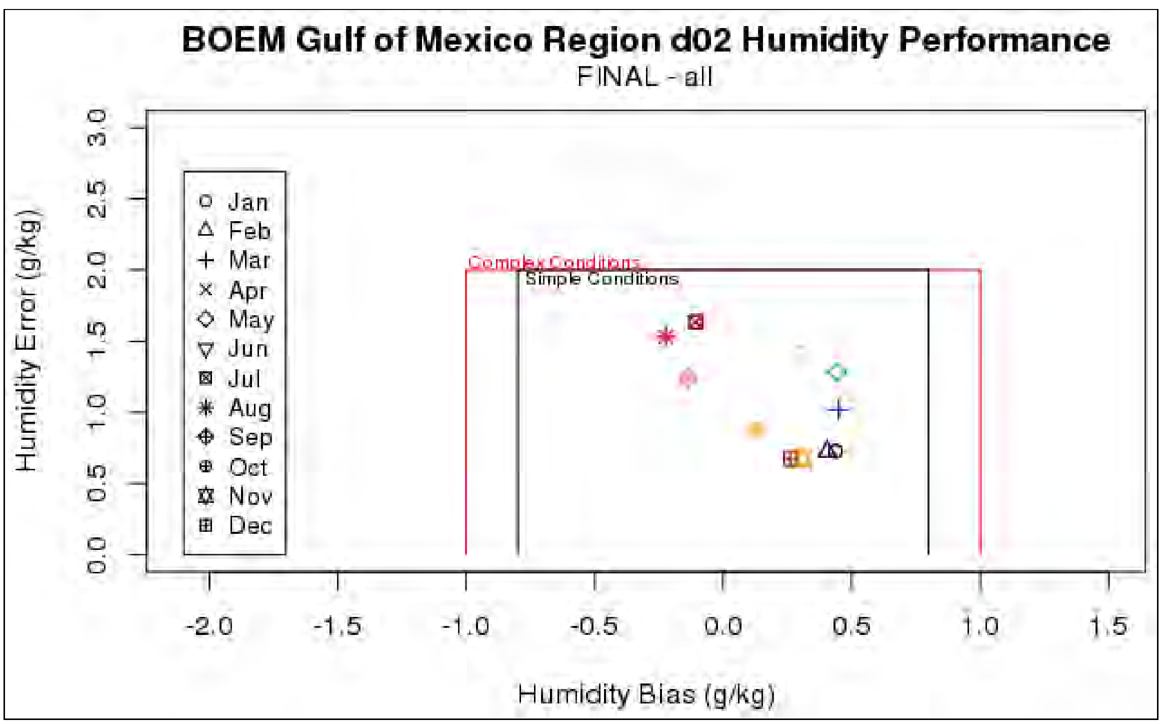


Figure F-12. BOEM Gulf of Mexico OCS Region WRF 12-km METSTAT Humidity Performance for 2012.

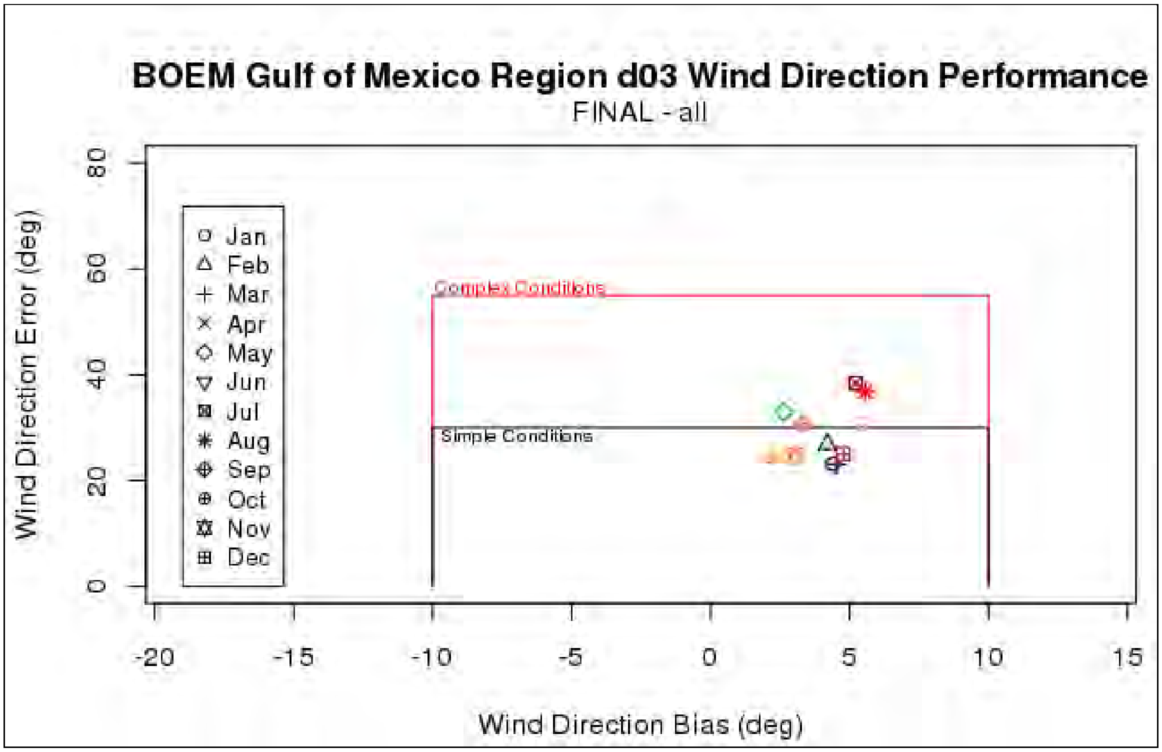


Figure F-13. BOEM Gulf of Mexico OCS Region WRF 4-km METSTAT Wind Direction Performance for 2012.

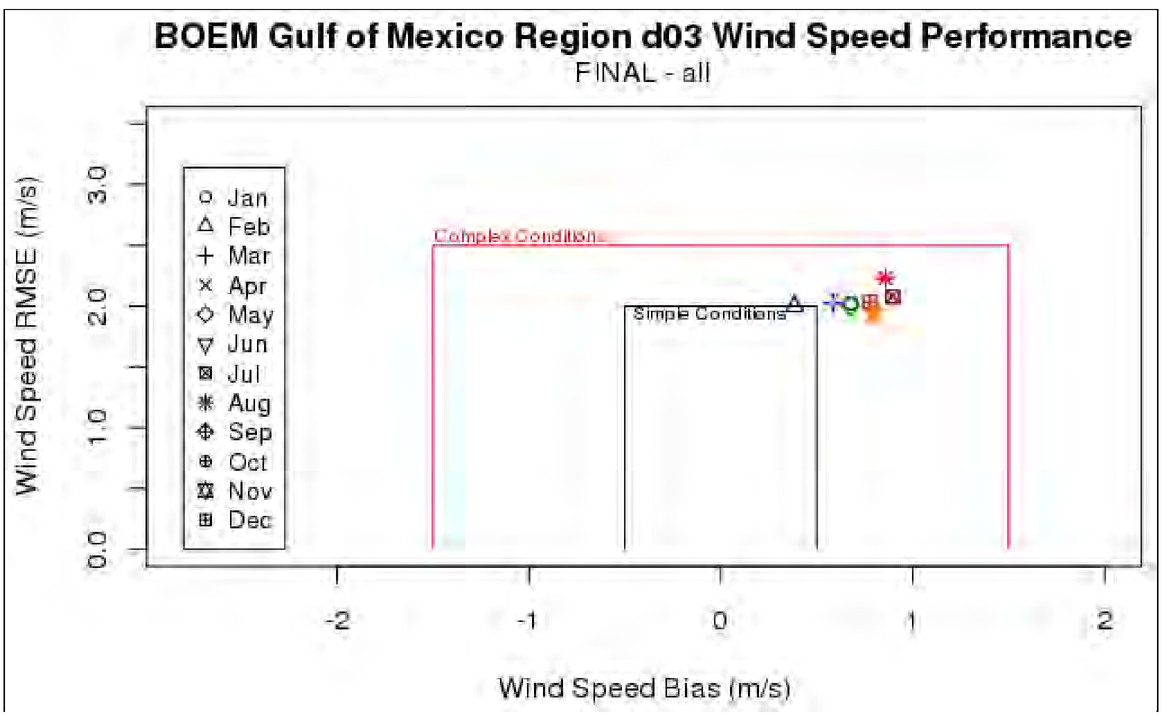


Figure F-14. BOEM Gulf of Mexico OCS Region WRF 4-km METSTAT Wind Speed Performance for 2012.

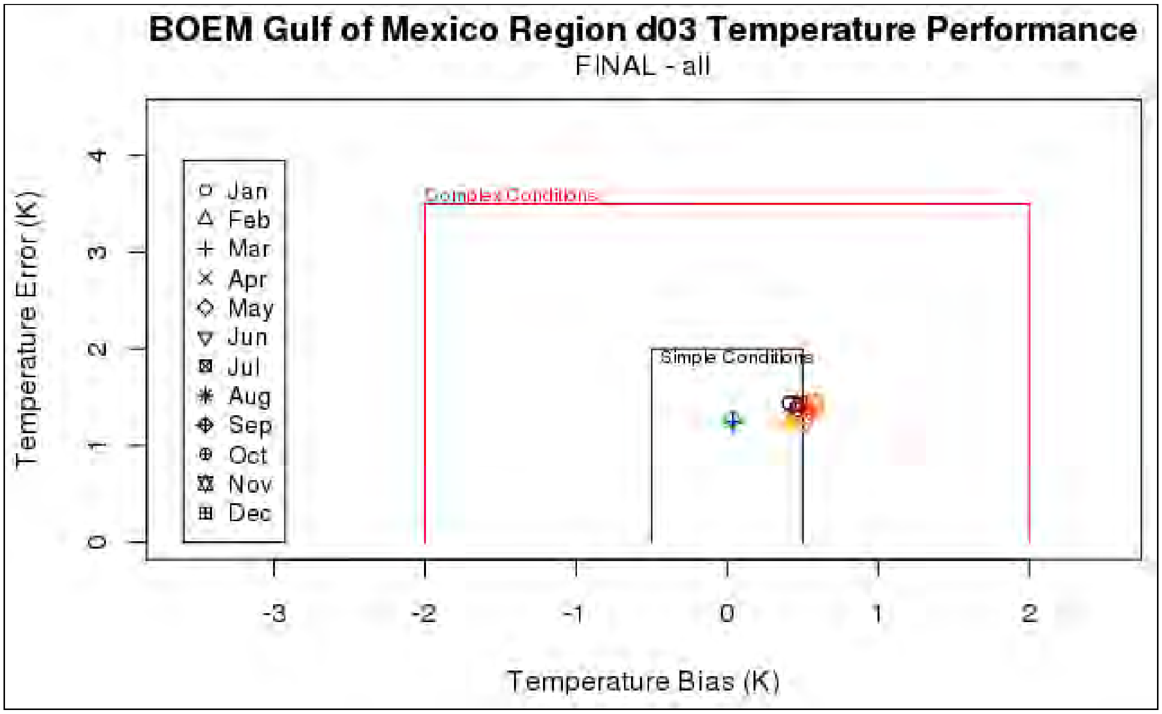


Figure F-15. BOEM Gulf of Mexico OCS Region WRF 4-km METSTAT Temperature Performance for 2012.

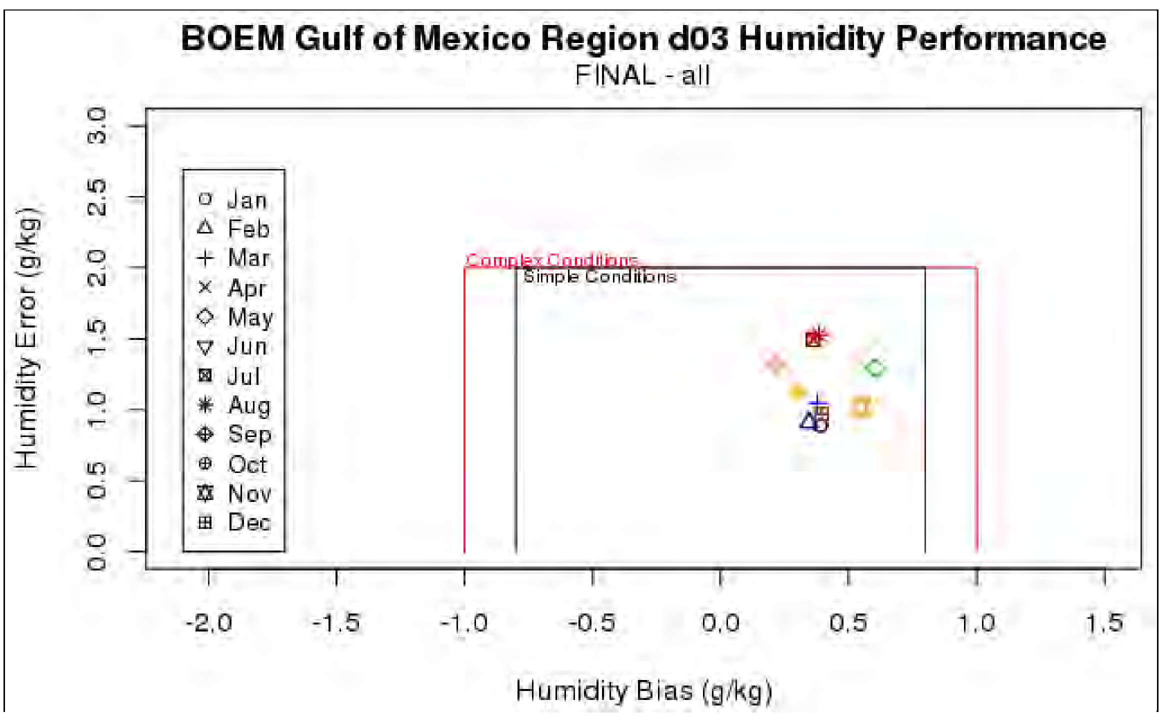


Figure F-16. BOEM Gulf of Mexico OCS Region WRF 4-km METSTAT Humidity Performance for 2012.

F.3.2 Qualitative Evaluation Using Wind Roses

The coastal sites of Gulfport, MS (KGPT); Naples, FL (NPSF); Port Isabel, TX (PTIT); and Calcasieu, LA (CAPL) were chosen to evaluate the frequency and intensity of onshore and offshore wind flow and WRF's performance at the land-sea interface. The locations of these sites are shown in **Figure F-17**. The 5-year comparisons of observed and modeled wind direction at each coastal site will be provided in the full WRF modeling report. Below, in **Figures F-17 through F-21**, the comparisons are made for only 2012. Wind direction observations were obtained from the DS3505 meteorological dataset, and modeled surface wind speed and wind direction were extracted from the 4-km WRF domain dataset using the Mesoscale Model Interface (MMIF) program (Brashers and Emery, 2015). Overall, WRF performs just satisfactorily at forecasting the frequency and intensity of onshore and offshore wind flow at the coastal sites. The WRF simulates the predominant NE wind direction at NPSF, as well as the strong SE winds at port PTIT and CAPL. However, WRF wind direction does not compare particularly well to KGPT in 2012 and does not replicate much of the NW wind at PTIT, or the SW wind at NPSF. The decline in apparent wind direction performance for 2012, compared to the 5-year analysis, is largely due to the shorter evaluation period.

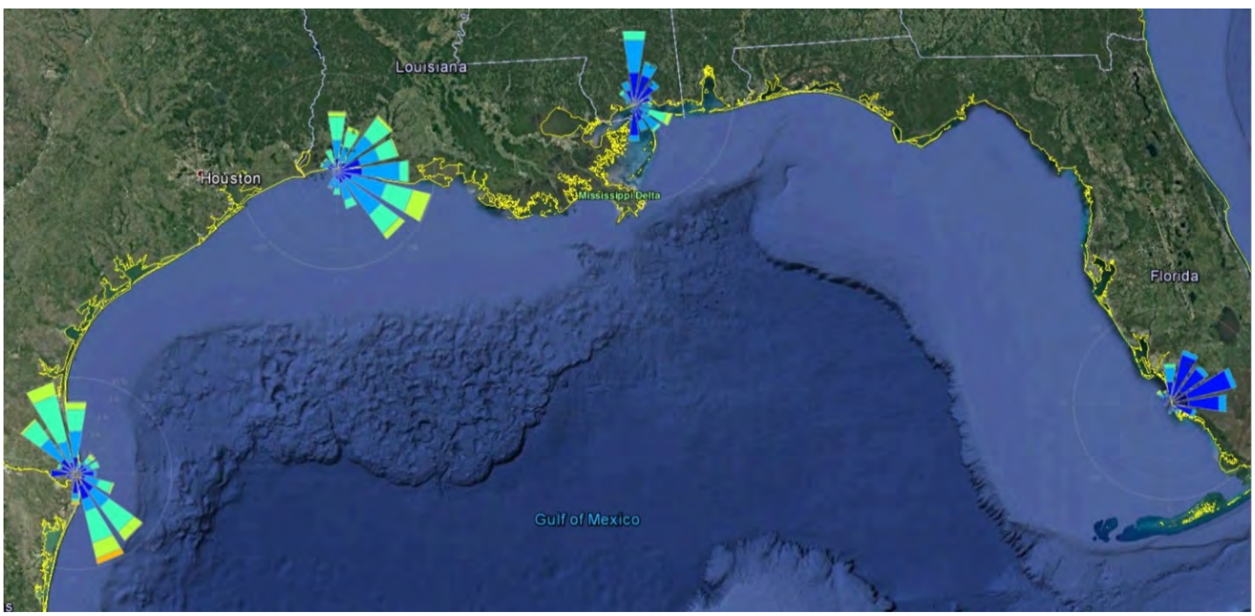


Figure F-17. Wind Rose Locations for Port Isabel, TX (PTIT), Calcasieu, LA (CAPL), Gulfport, MS (KGPT), and Naples, FL (NPSF).

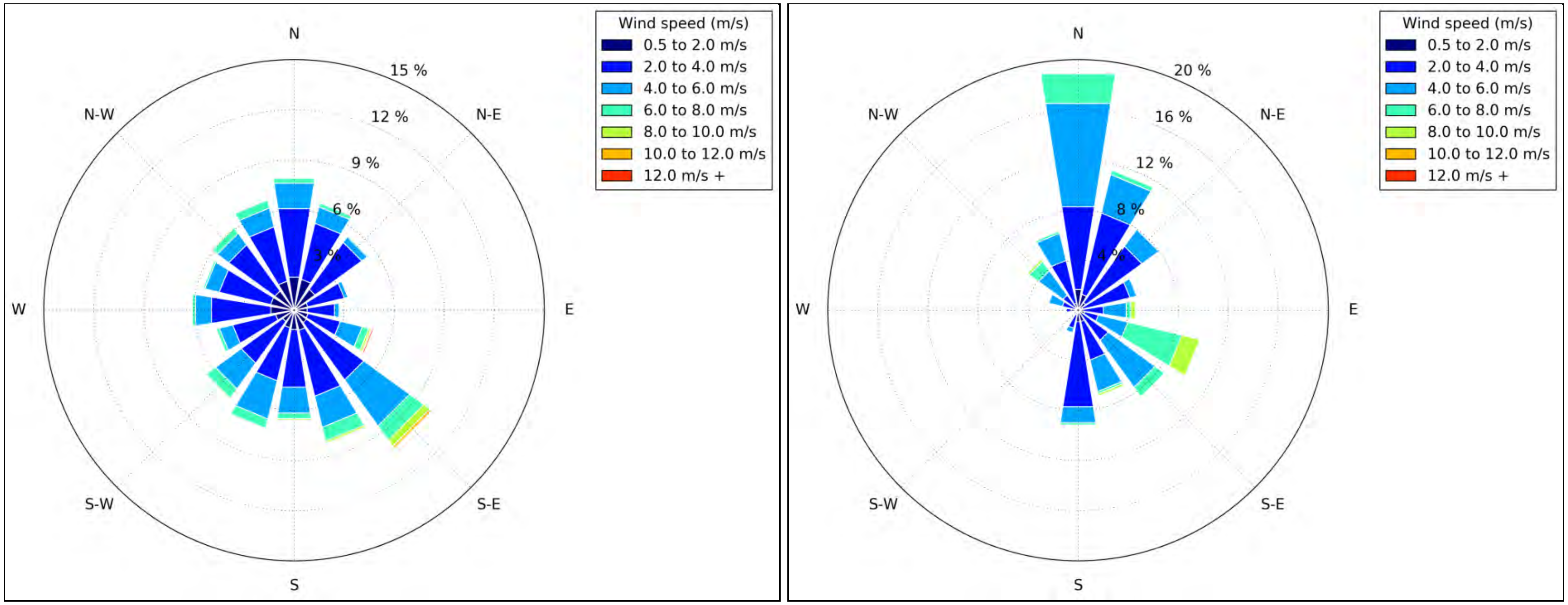


Figure F-18. 2012 WRF Wind Rose (left) Compared to 2012 Observation Wind Rose from Gulfport, MS (right) in 4-km Domain.

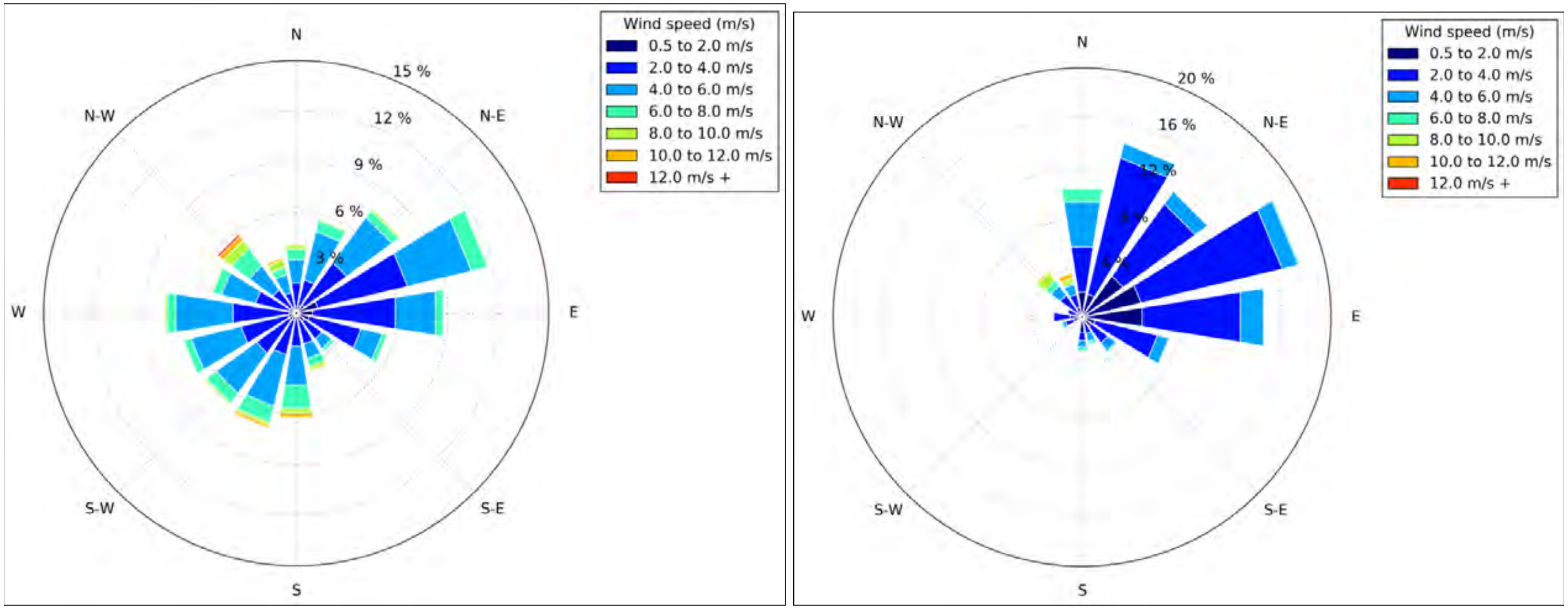


Figure F-19. 2012 WRF Wind Rose (left) Compared to 2012 Observation Wind Rose from Naples, FL (right) in 4-km Domain.

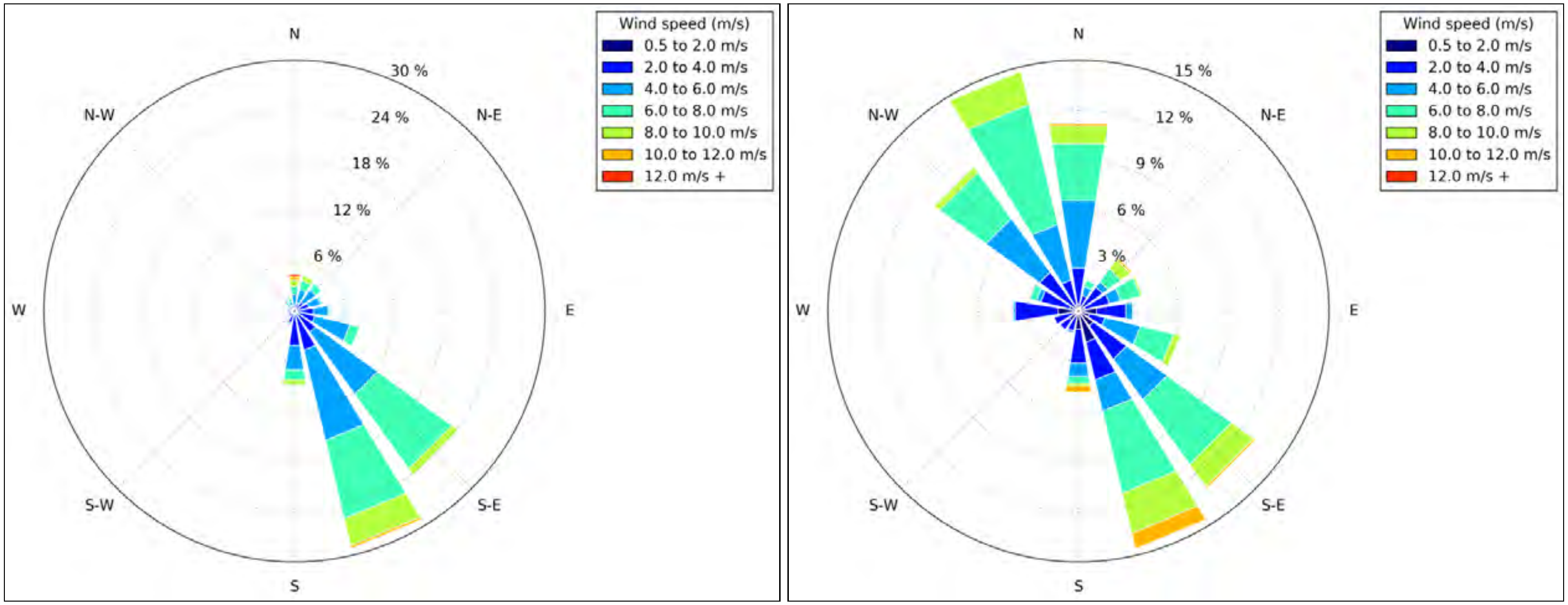


Figure F-20. 2012 WRF Wind Rose (left) Compared to 2012 Observation Wind Rose from Port Isabel, TX (right) in 4-km Domain.

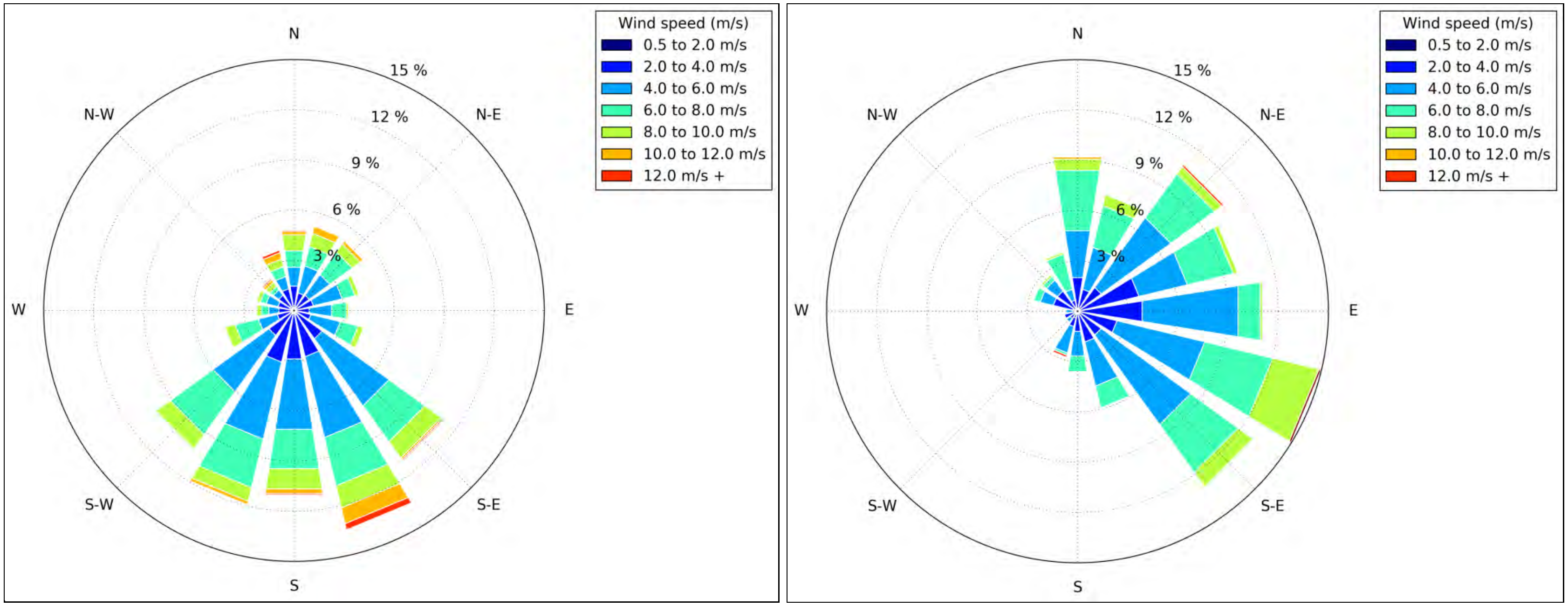


Figure F-21. 2012 WRF Wind Rose (left) Compared to 2012 Observation Wind Rose from Calcasieu, LA (right) in 4-km Domain.

F.3.3 Qualitative Evaluation Using Upper-Air Data

Plots of the sounding profiles of temperature and dew point for the vertical atmosphere were created using observational data from the Brownsville, TX (KBRO) and Key West, FL (KEYW) airports and the corresponding WRF data points. A random selection of upper air profiles was taken from the year-long dataset for a sampling of several different atmospheric situations. These are qualitatively compared, paying particular attention to how well the WRF model reproduces the observed near-surface inversion layers.

The KBRO and KEYW radiosonde datasets are collected by and maintained by the National Weather Service (NWS). Radiosondes are launched twice per day, at approximately 00 and 12 UTC. Radiosondes provide high-resolution vertical profiles of temperature, humidity, wind speed, and wind direction throughout the troposphere. The data are made publicly available by NOAA's Earth System Research Laboratory (USDOC, NOAA, ESRL, 2015). Ramboll Environ downloaded and stored the radiosonde data twice daily for 2012 for each upper air station in FSL format for use in WRF model dataset comparisons.

For the qualitative analysis, **Figure F-22** shows the vertical profiles of temperature and humidity from the observational and 4 km WRF datasets for Brownsville, TX and Key West, FL. The analysis focuses on how well the WRF model reproduces the vertical atmosphere structure using upper air observations from the selected sites within the 4-km domain, which have timeframes that overlap with the WRF model. The left panel in **Figure F-22** shows an evening sounding in August for Brownville, TX, which contains a weak elevated subsidence inversion. The WRF forecasts the base of the inversion well at around 900 meters. The right panel of **Figure F-22** shows observed and modeled vertical profiles for January in Key West, FL. The WRF forecasts the elevated subsidence inversion well, with a mixing height top at around 1,000 meters on the left panel. The dry air above the inversion is also represented well in the evening sounding at Key West, FL.

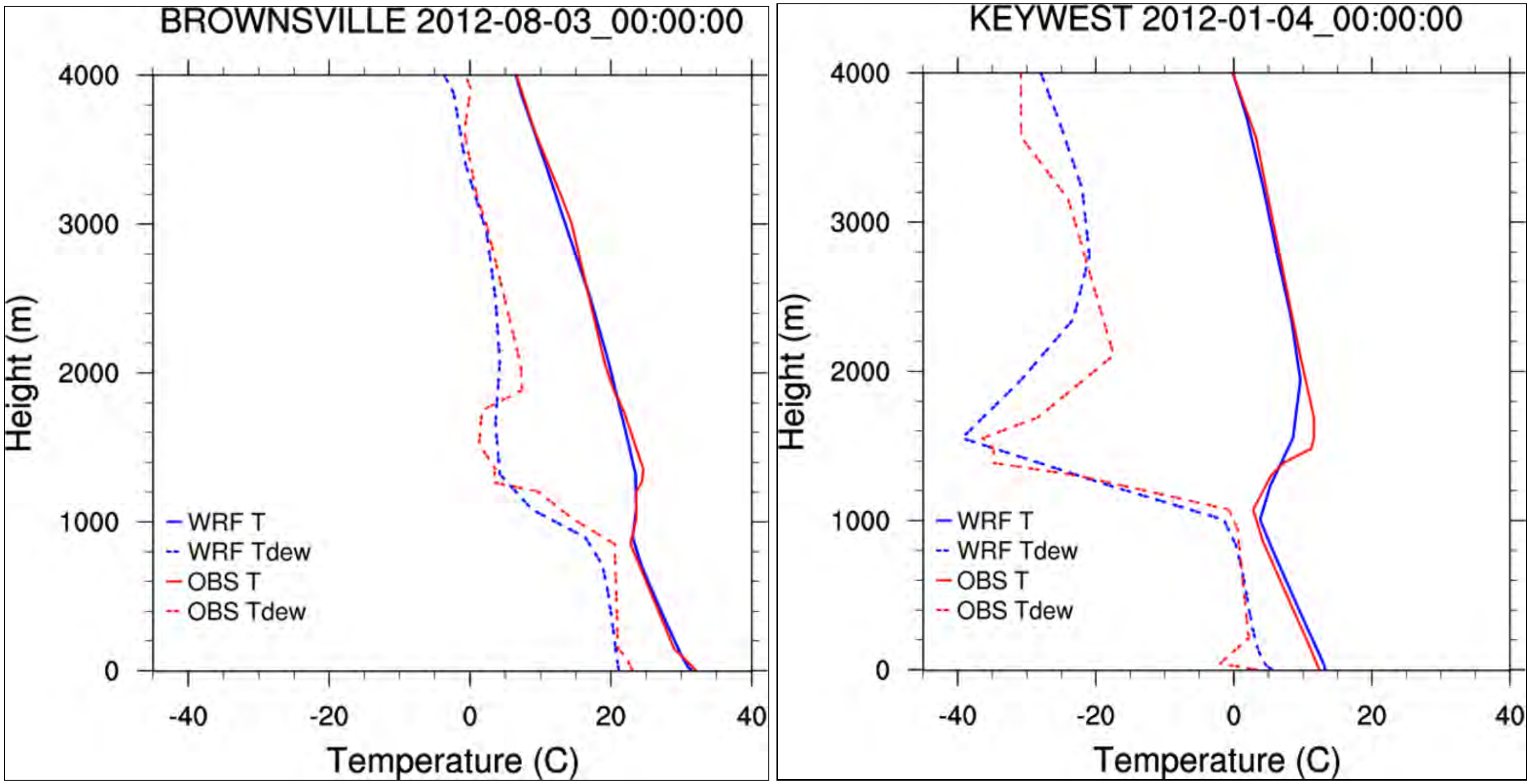


Figure F-22. Vertical Profile Soundings Comparing the 4-km WRF (blue lines) to Upper-Air Observations Data (red lines) for Brownsville, TX on August 3, 2012, and Key West, FL on January 4, 2012, at 00 UTC.

F.3.4 Qualitative Evaluation Using Precipitation

Precipitation removes chemicals and particulates from the air via wet deposition, and thus is an important parameter for high-quality dispersion modeling. Several precipitation datasets were evaluated for use in model comparisons. Ramboll Environ has used the Parameter-elevation Regressions on Independent Slopes Model (PRISM) dataset for rainfall extensively in the past, but it only covers the over-land portion of the modeling domain. Land-based RADAR retrievals of precipitation typically have larger uncertainty and are limited in geographic coverage to the area relatively near the coast and, as a result, were not chosen for this performance evaluation. Satellite-based retrievals are typically lower resolution and also feature larger uncertainty, but cover the entire Gulf of Mexico OCS region. Ramboll Environ performed comparisons between the BOEM Gulf of Mexico OCS Region WRF modeled precipitation output with the PRISM and Tropical Rainfall Measurements Mission (TRMM) satellite datasets.

The Oregon State University PRISM Climate Group gathers temperature and precipitation data from a range of monitoring networks, applies sophisticated quality control methods, and uses the data to produce spatial grids of climate parameters (Daly et al., 2008). The time series datasets are modeled using climatologically-aided interpolation (CAI), which uses the long-term average pattern as first-guess of the spatial pattern of climatic conditions. Both a daily product and a monthly product are available. The precipitation observations used in the daily PRISM product includes radar measurements, which the monthly product does not take into account. This may cause dramatic local differences between the two datasets in monthly totals.

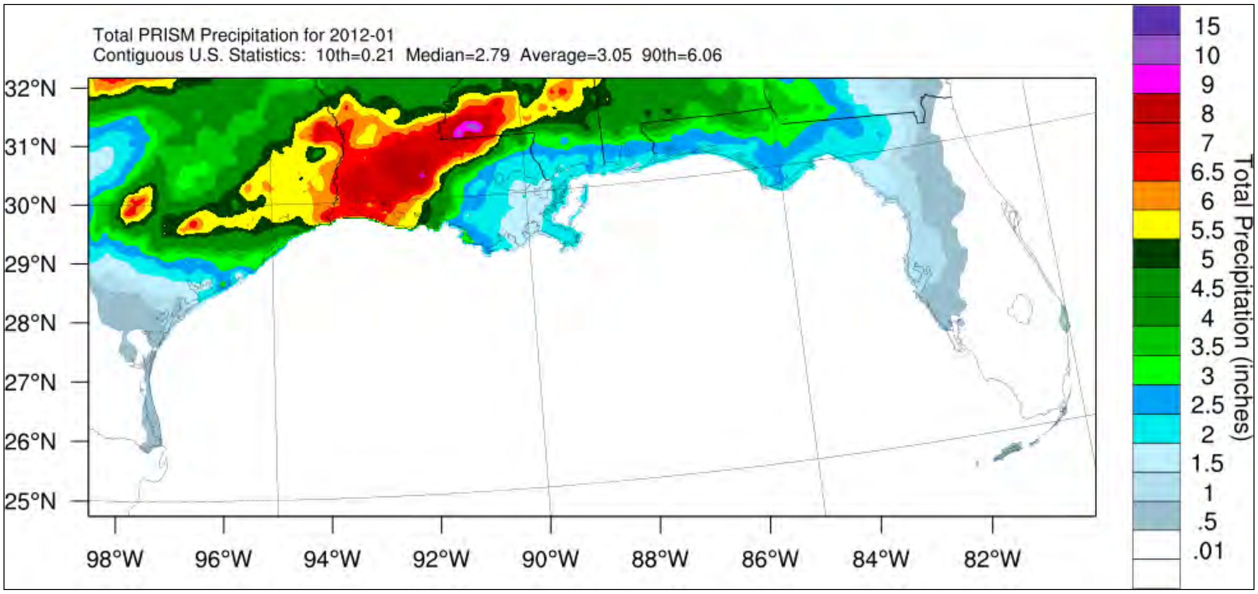
TRMM was a joint mission being flown by the National Aeronautics and Space Administration (NASA, U.S.) and the Japan Aerospace Exploration Agency (JAXA, Japan) to improve our quantitative knowledge of the 3-dimensional distribution of precipitation in the tropics. TRMM had a passive microwave radiometer (TRMM Microwave Imager, TMI), the first active space-borne Precipitation Radar (PR), a Visible-Infrared Scanner (VIRS), and other instruments. Coordinated observations are intended to result in a "flying raingauge" capability. The TRMM dataset is coarser than the PRISM data (0.5 degrees, or about 55 km, vs. 4km) but is available every 3 hours.

F.3.4.1 Evaluation Over Land Using PRISM Precipitation

High-resolution (4 km) PRISM datasets cover the contiguous U.S. in both monthly and daily output versions (Daly et al., 2008). Here WRF precipitation output is compared to the PRISM over-land portions of the Gulf of Mexico. Ramboll Environ re-projected and aggregated the PRISM data to the WRF projection’s grid cell locations, and the resulting gridded data was plotted and the gridded fields saved. This allows for consistent visual qualitative comparison.

The full WRF modeling report will display 5-year average (2010-2014) monthly precipitation plots constructed from BOEM Gulf of Mexico OCS Region WRF output, masked to only display over-land measurements, and compared to PRISM 5-year average (2010-2014) monthly plots for January through December in the 4-km domain. Below, WRF monthly precipitation totals are compared to corresponding PRISM totals for 2012 only. The results are mostly representative of the 5-year monthly averages and are briefly summarized in the following paragraph.

For the months of January through March, shown in **Figures F-23 through F-25**, WRF represents the spatial extent of the precipitation well, recreating the comparatively drier areas of central Texas and southern Florida. However, the model does under-estimate the total amount of average monthly rainfall across a small portion of southern Mississippi and south central Louisiana during this period. In April and May, **Figures F-26 and F-27**, the model shifts to overestimating rainfall in the same region, but otherwise depicts both the spatial distribution and amount of precipitation well over land, compared to PRISM. During the summer months of June through August, shown in **Figures F-28 through F-30**, WRF performs exceptionally well in re-creating the precipitation extent across the land portions of the domain, including the convergence zones across the east and west coasts of Florida. The model does slightly over-predict the amount of rainfall accumulations in the southern Georgia and southern Alabama areas. This is likely due to the higher humidity rates in the model during the summertime period. In September, shown in **Figure F-31**, WRF slightly under-predicts averaged precipitation rates over the land portion of the domain but over-forecasts the extent of rainfall over the northern Florida area. The WRF performed exceptionally well from October through December, shown in **Figures F-32 through F-34**, reproducing the extent and amount of rainfall very accurately, compared to PRISM totals. Overall, WRF performed very well in reproducing the spatial extent of precipitation over the land portions of Gulf of Mexico OCS region throughout 2012.



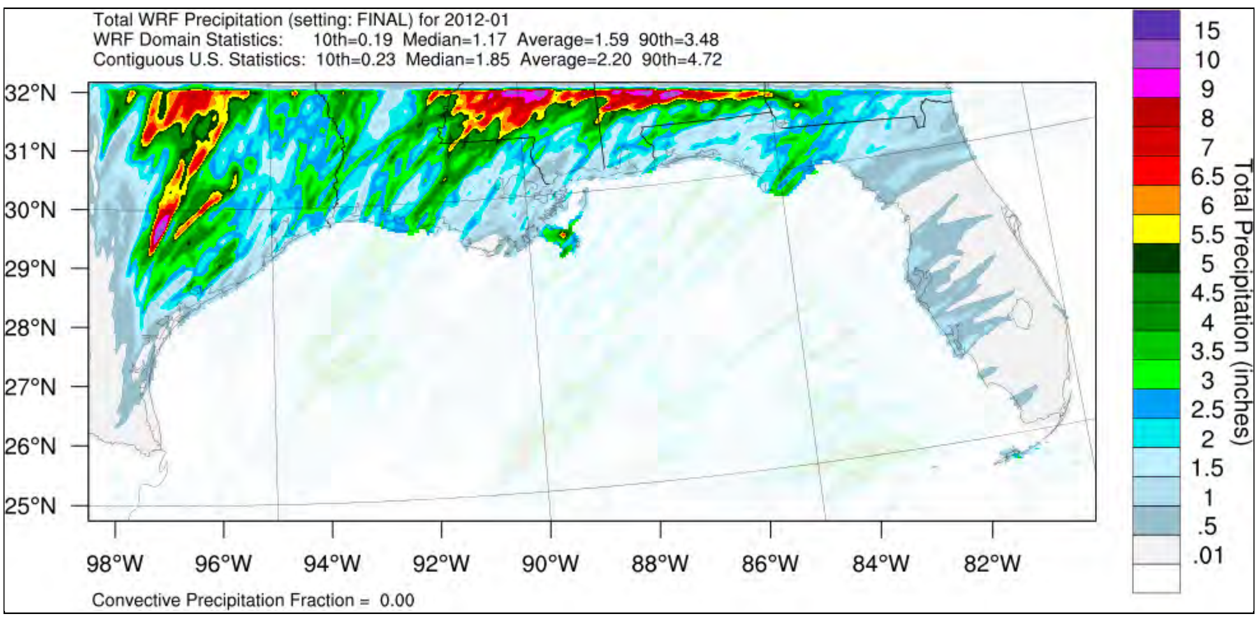
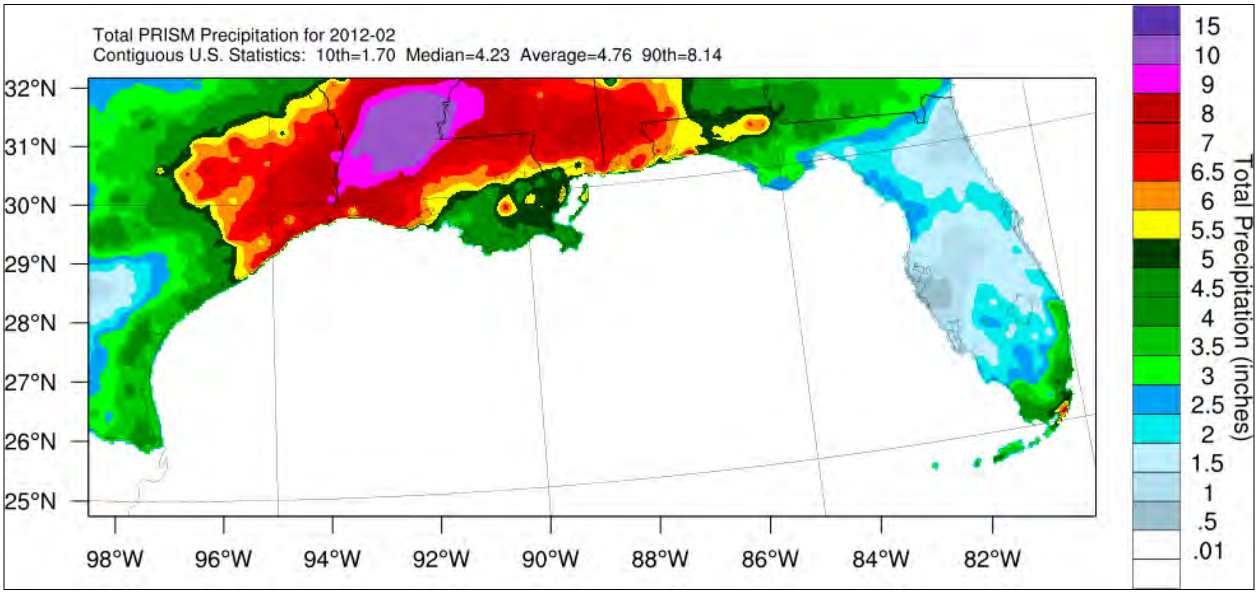


Figure F-23. January 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.



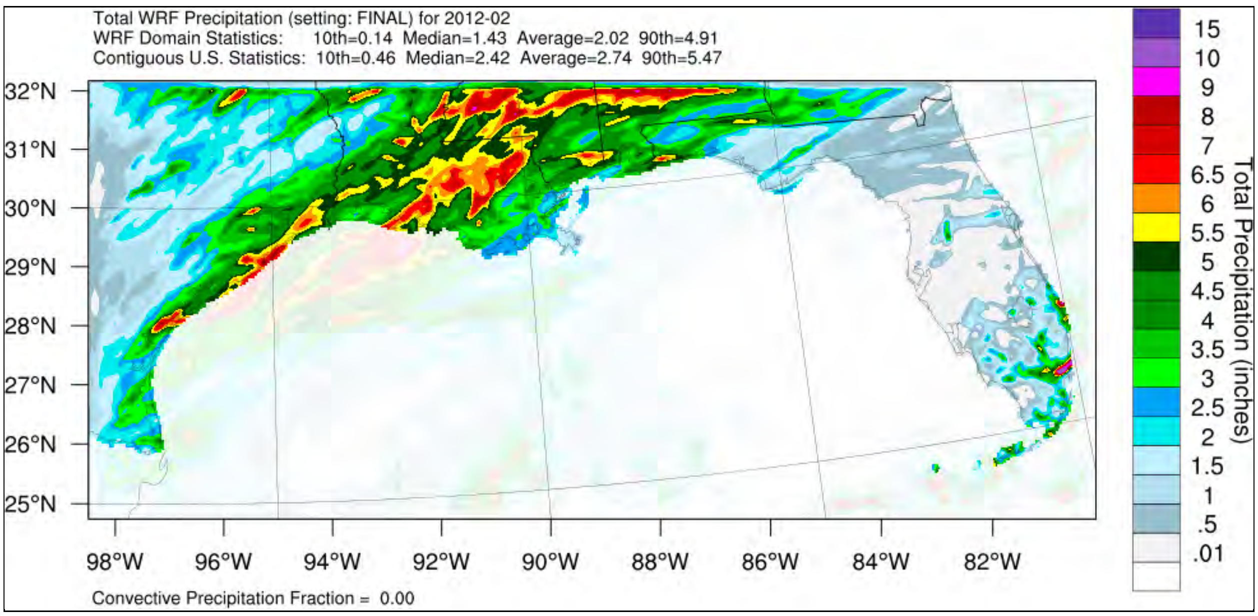
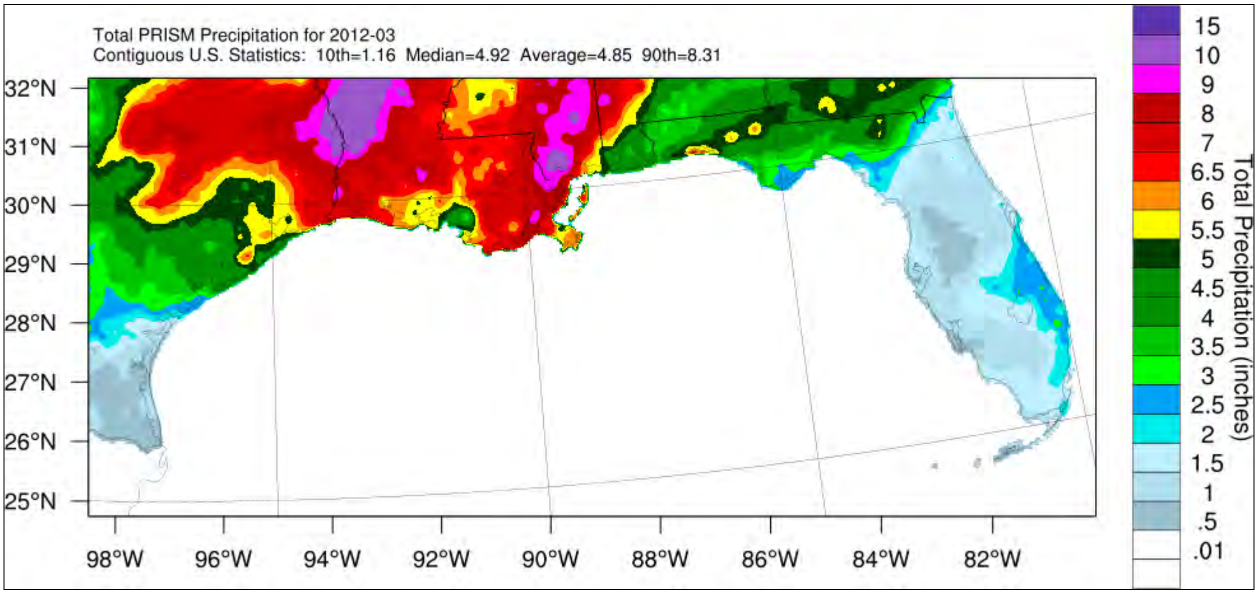


Figure F-24. February 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.



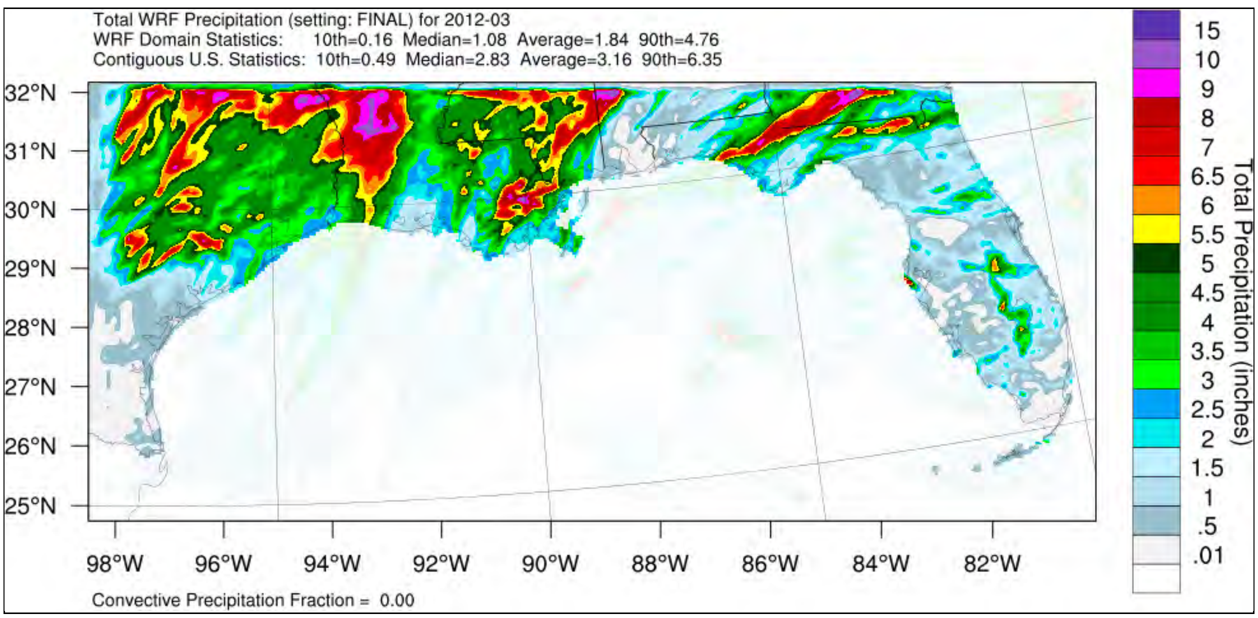
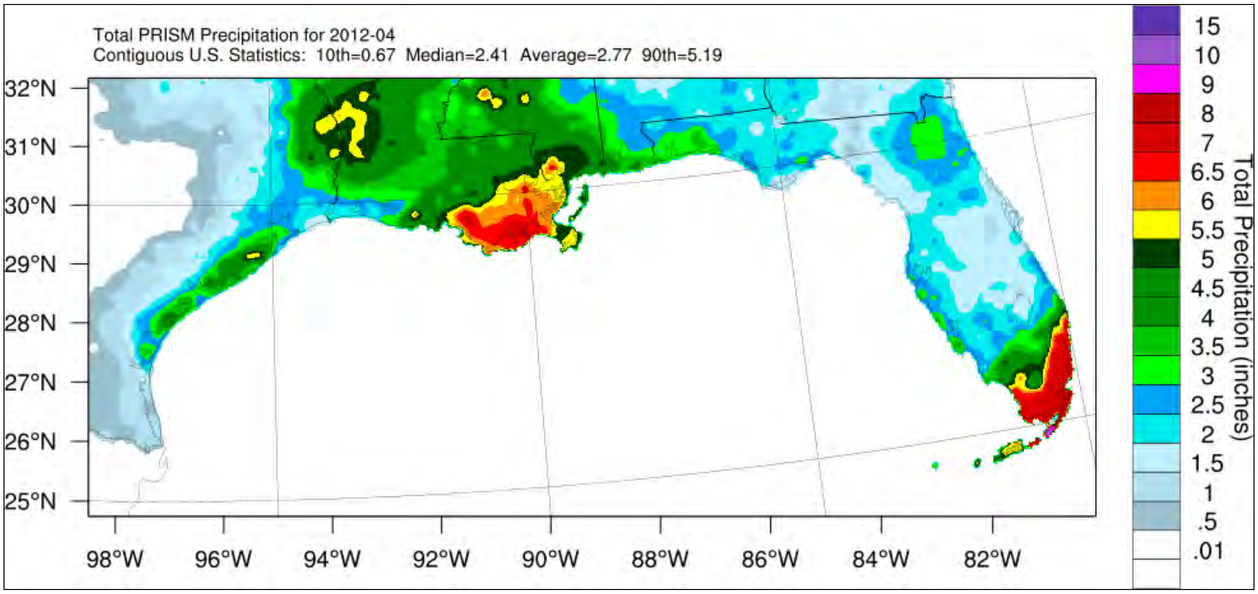


Figure F-25. March 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.



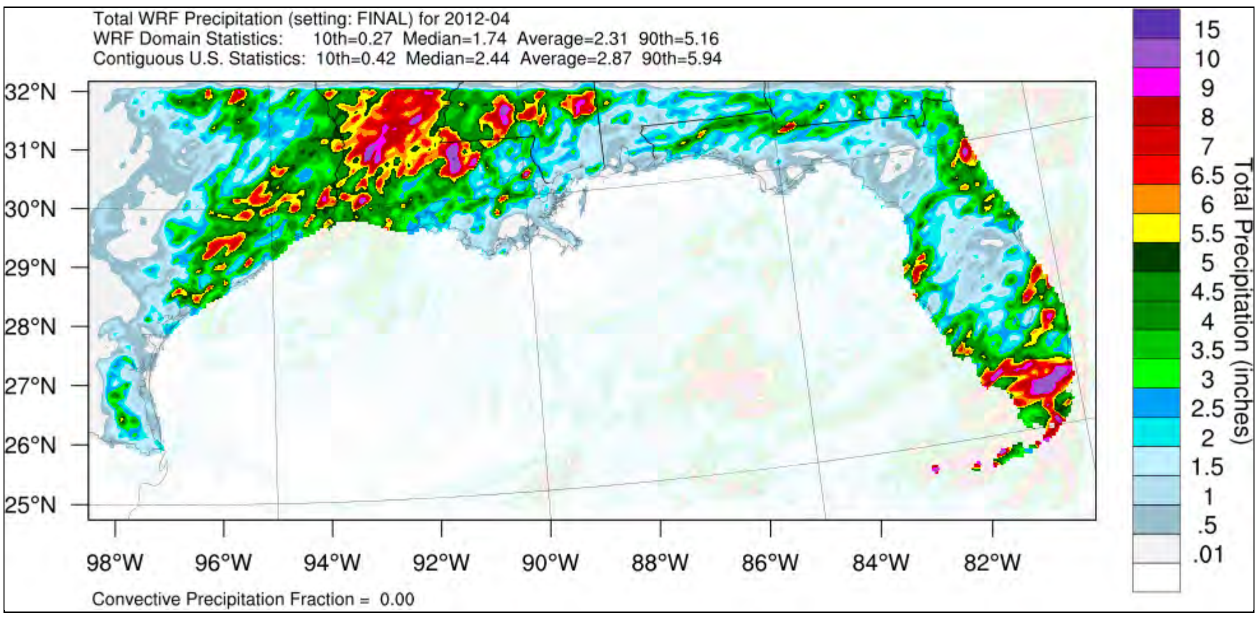
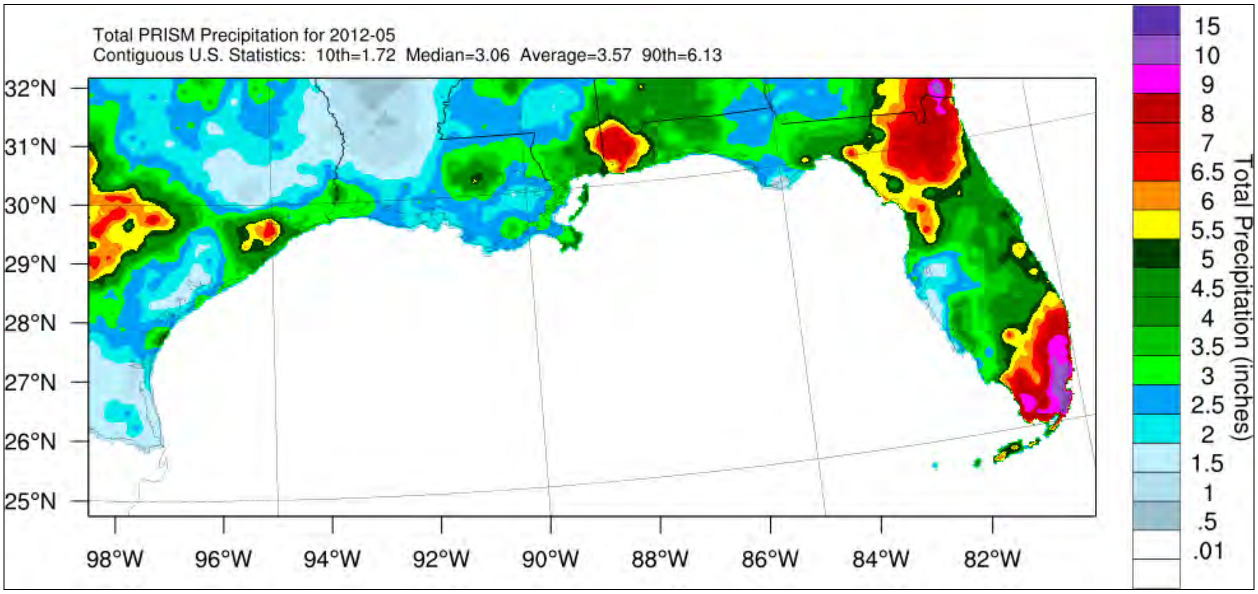


Figure F-26. April 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.



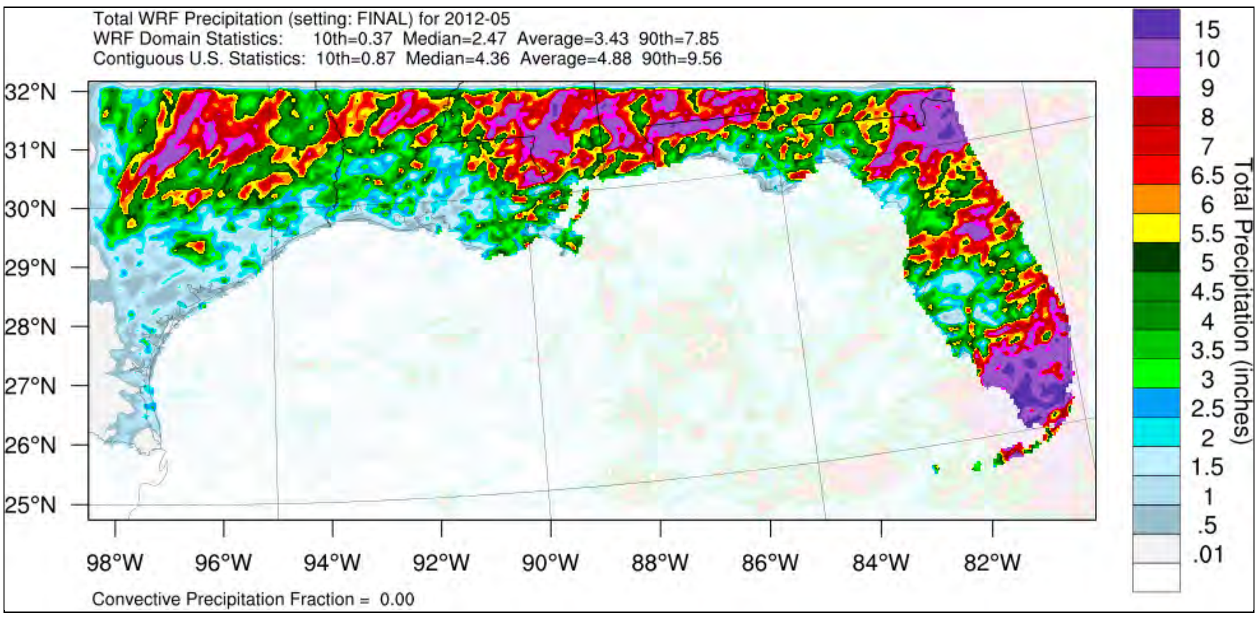


Figure F-27. May 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.

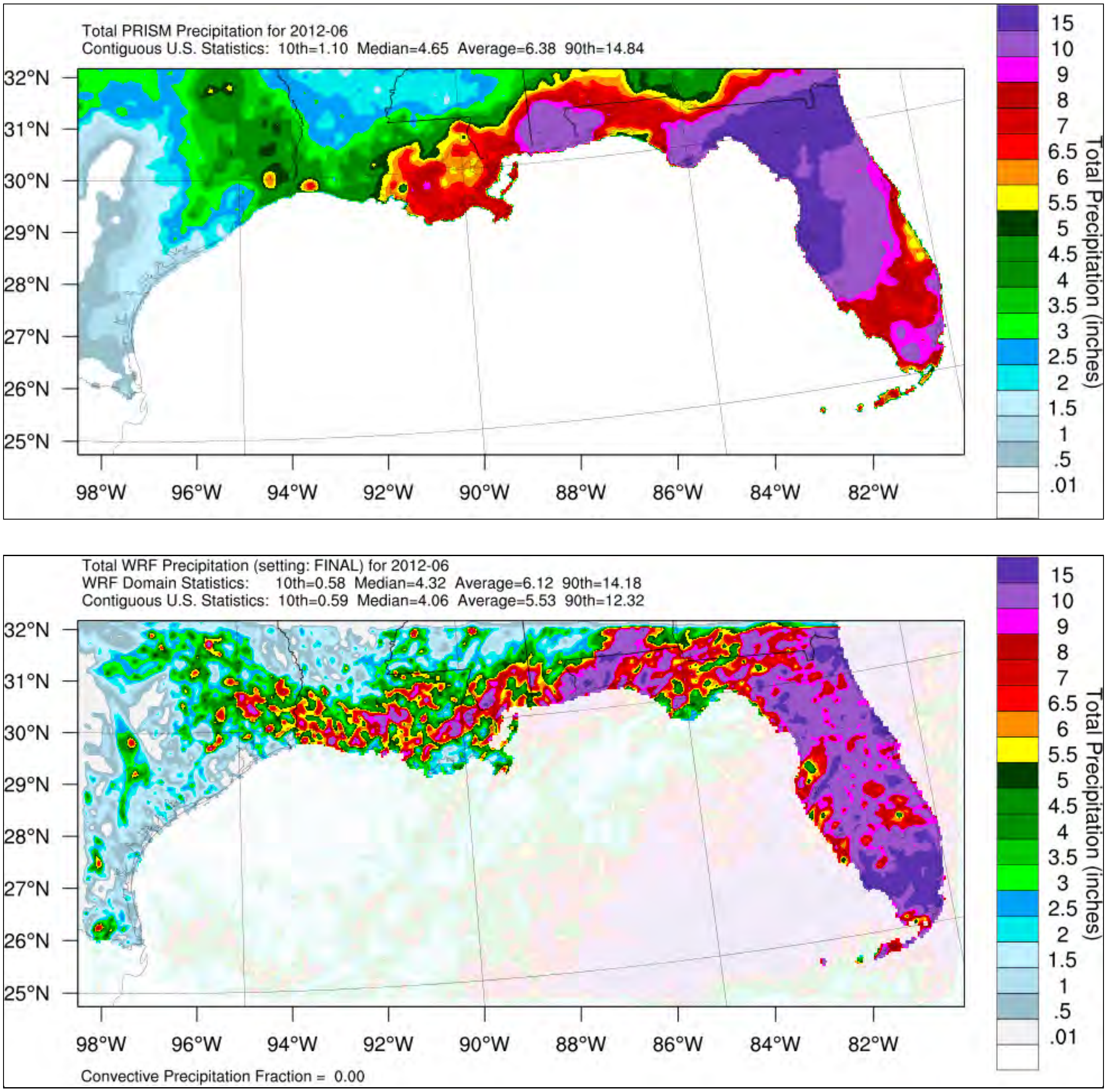


Figure F-28. June 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.

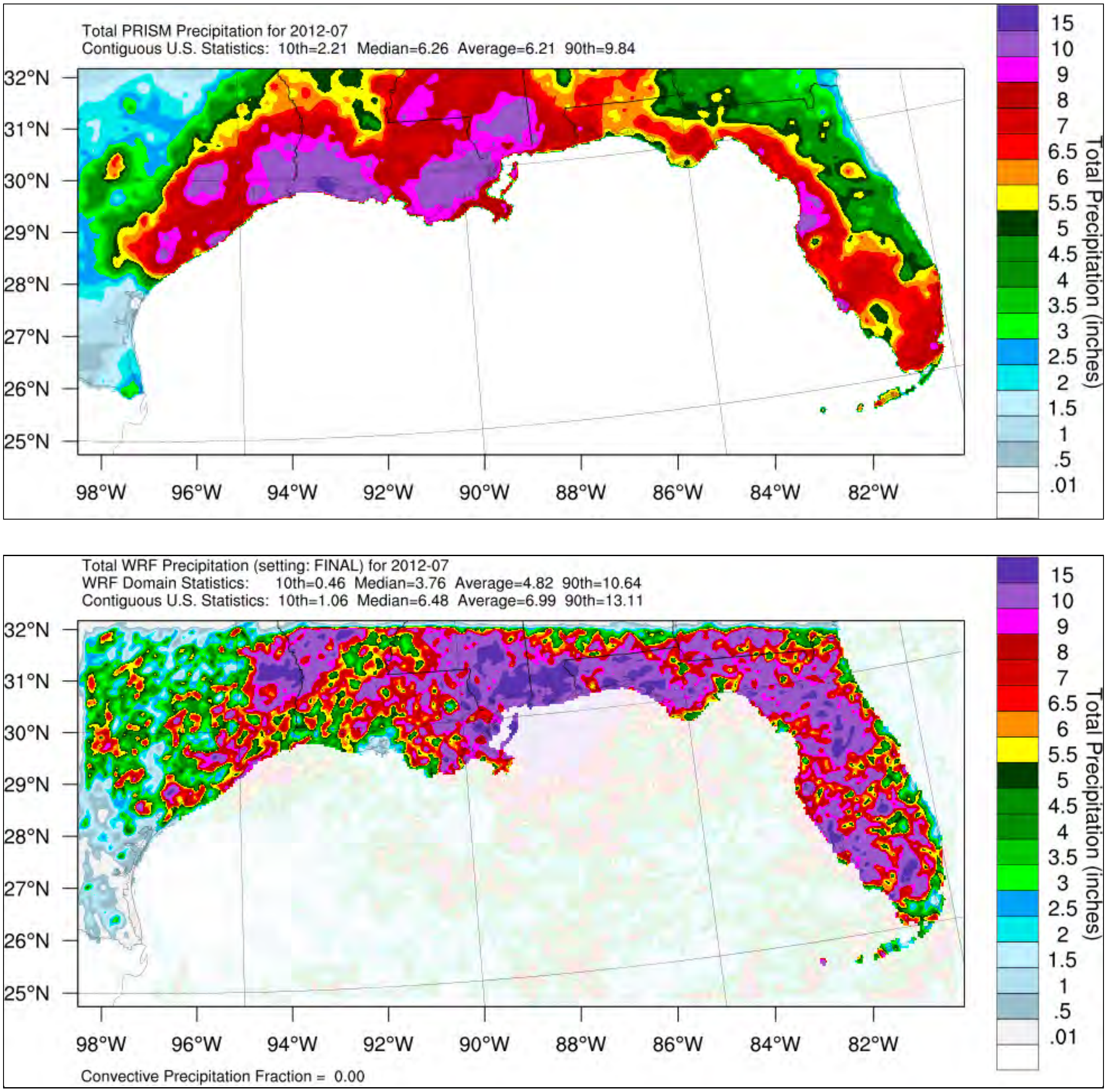


Figure F-29. July 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.

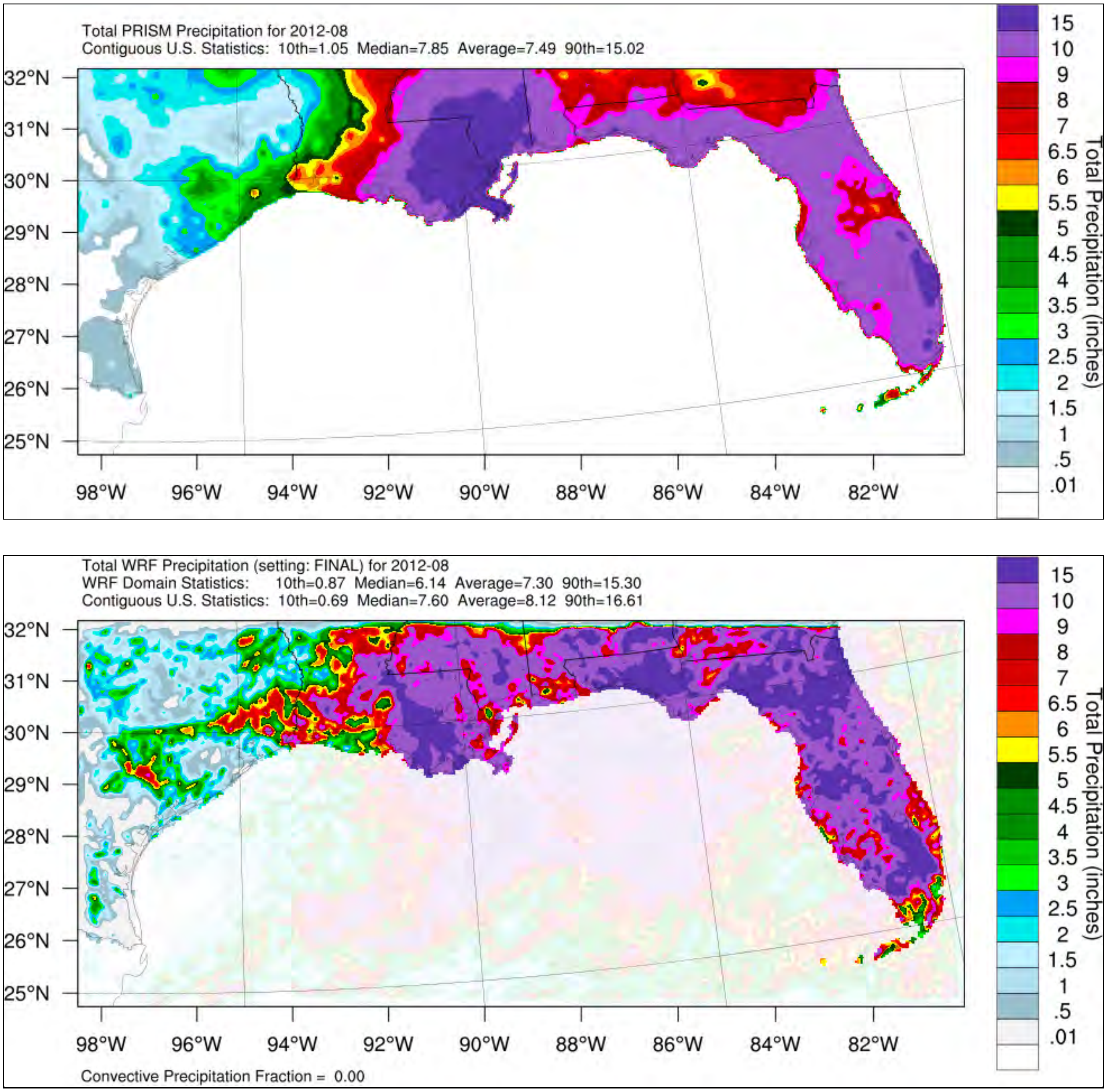
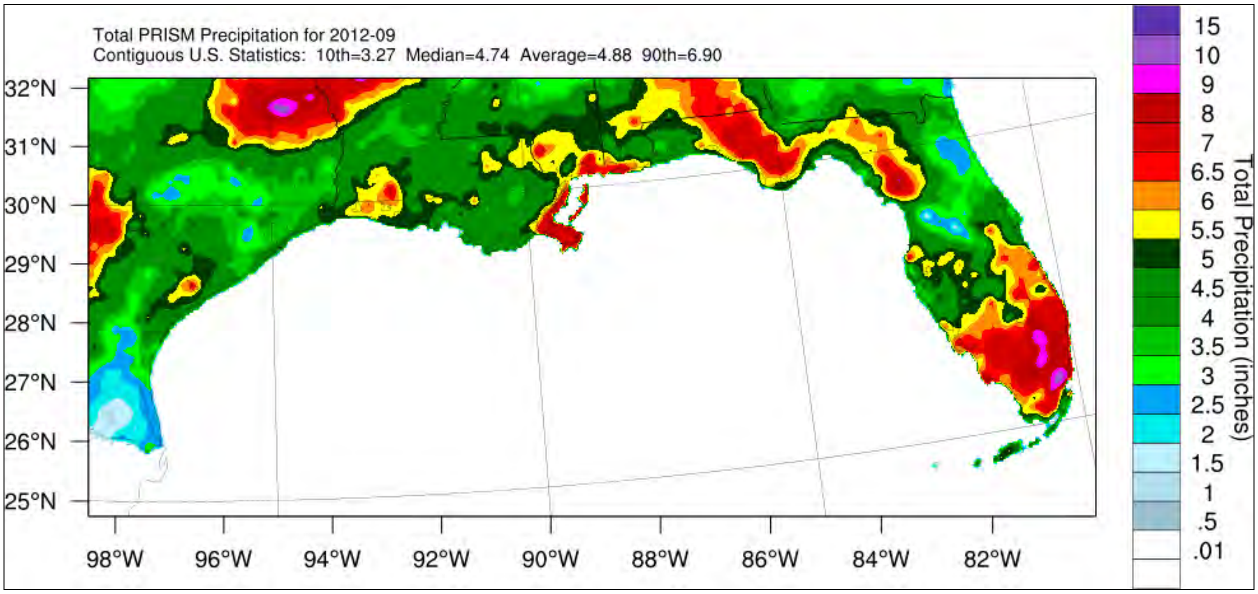


Figure F-30. August 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.



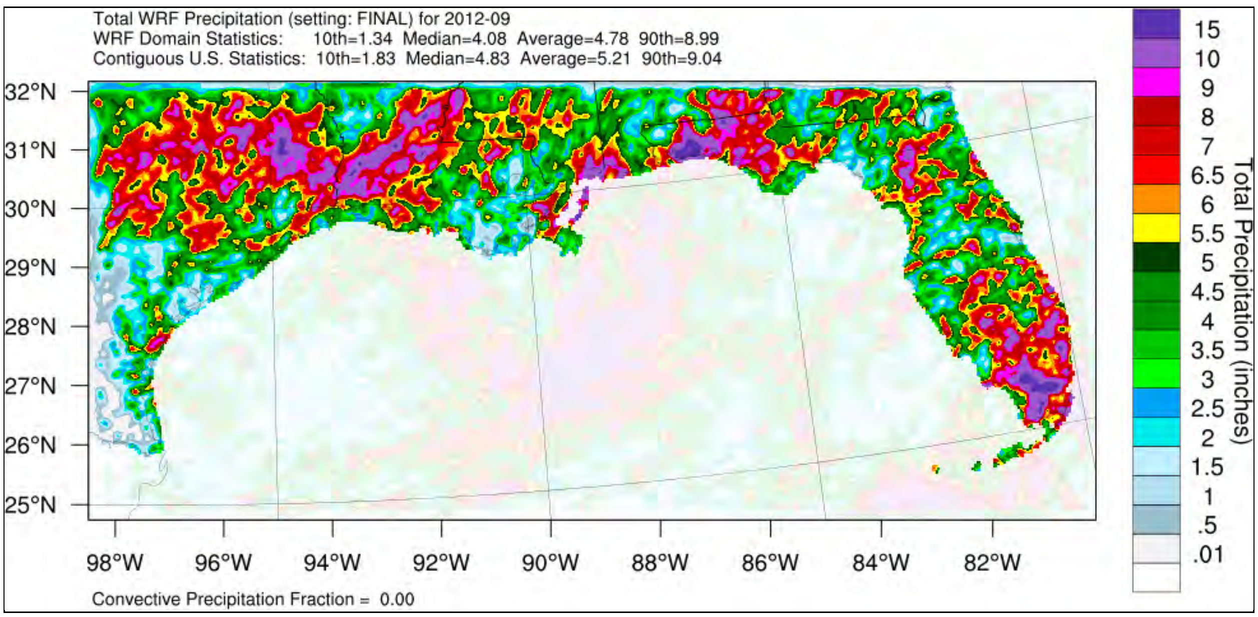
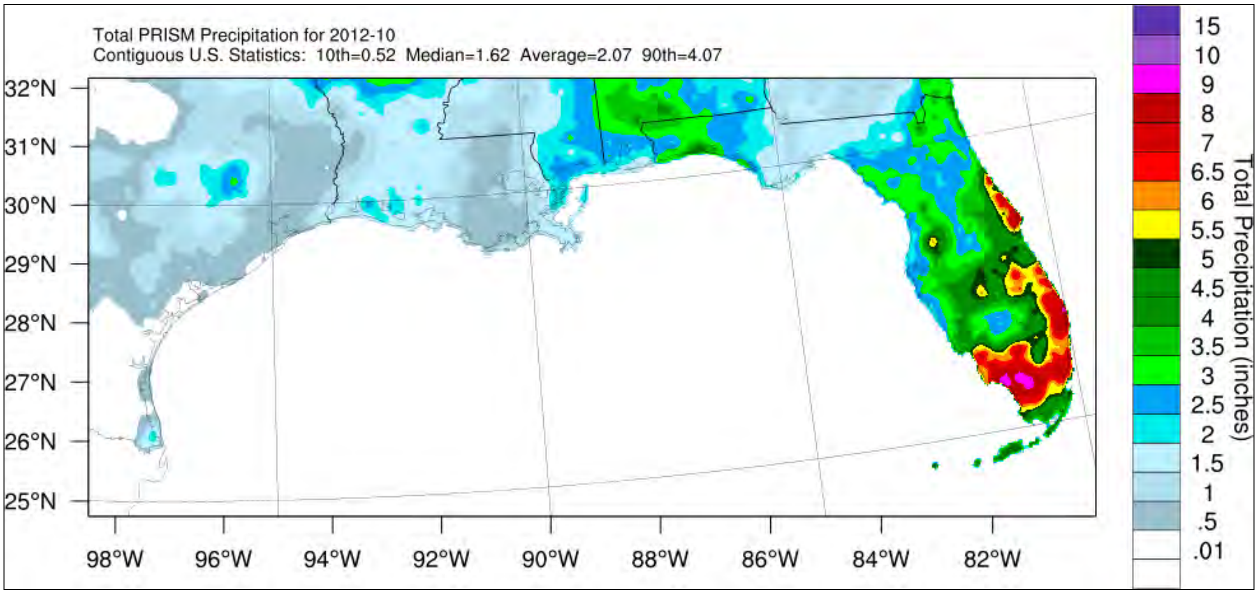


Figure F-31. September 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.



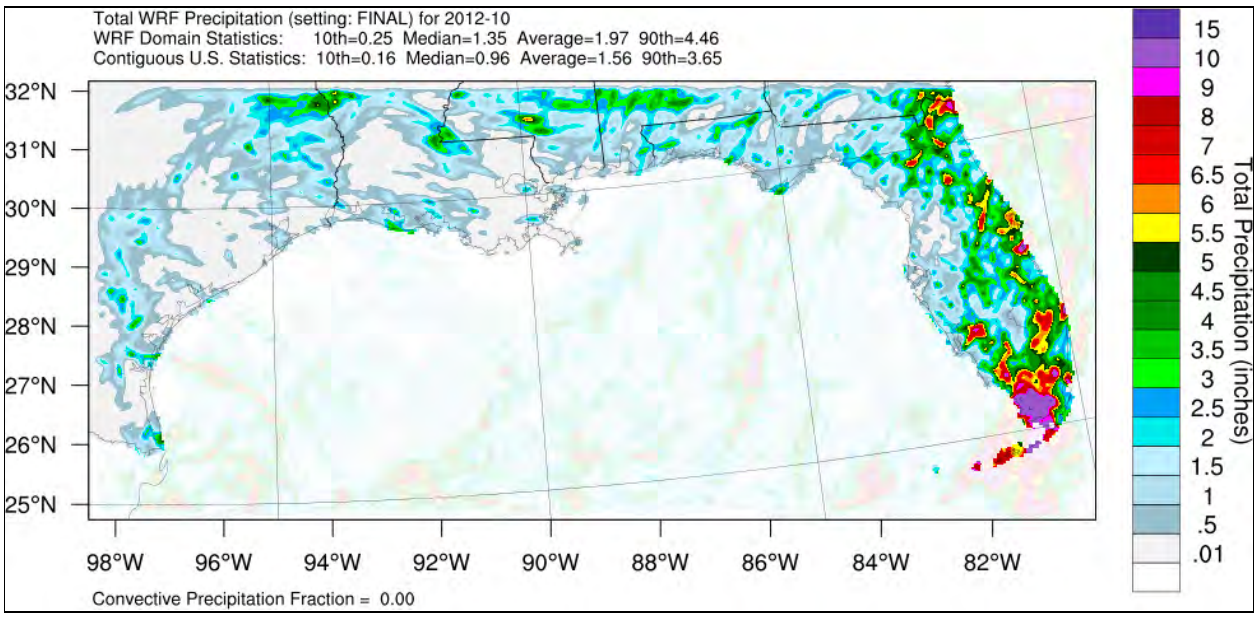


Figure F-32. October 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.

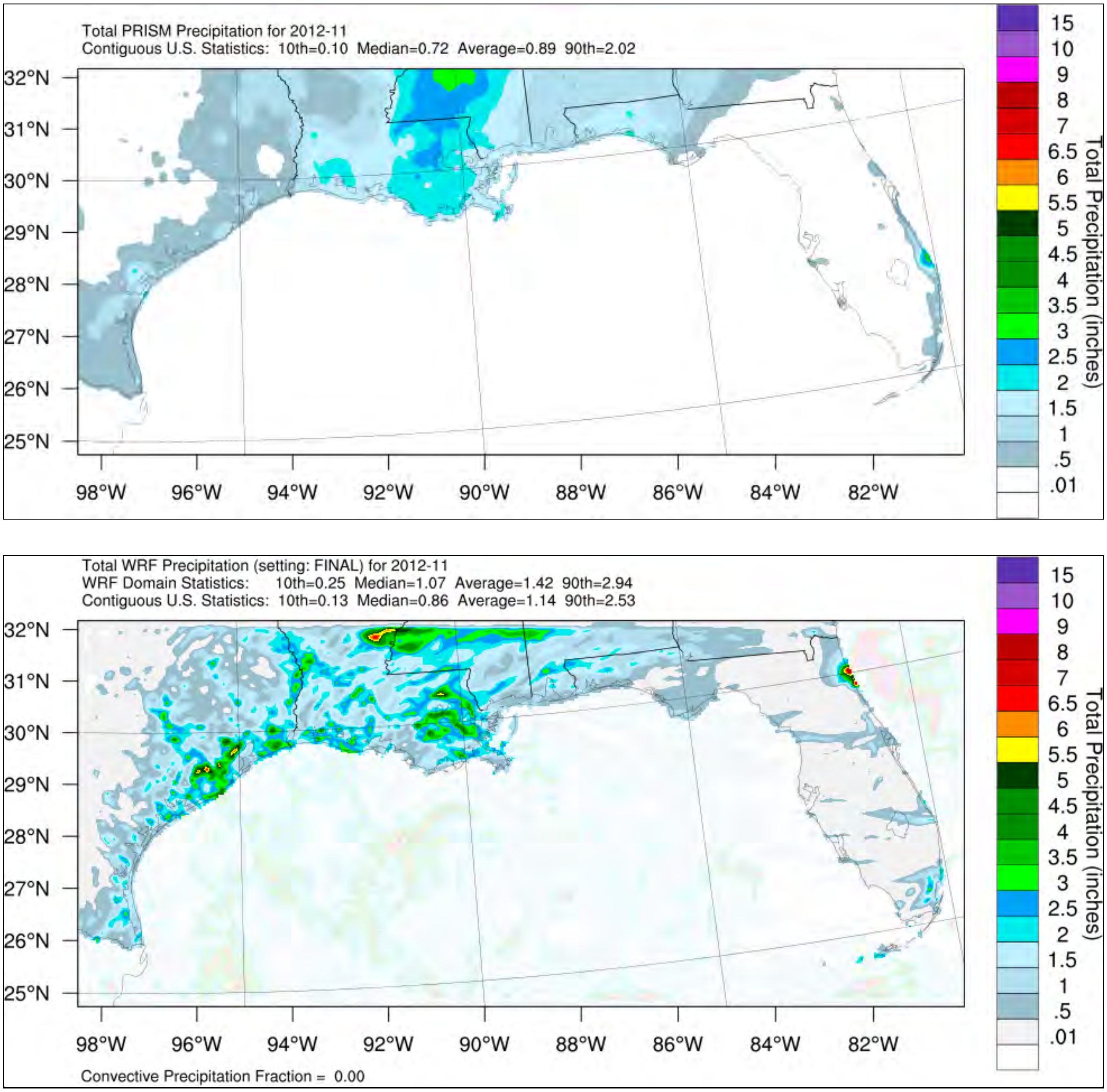
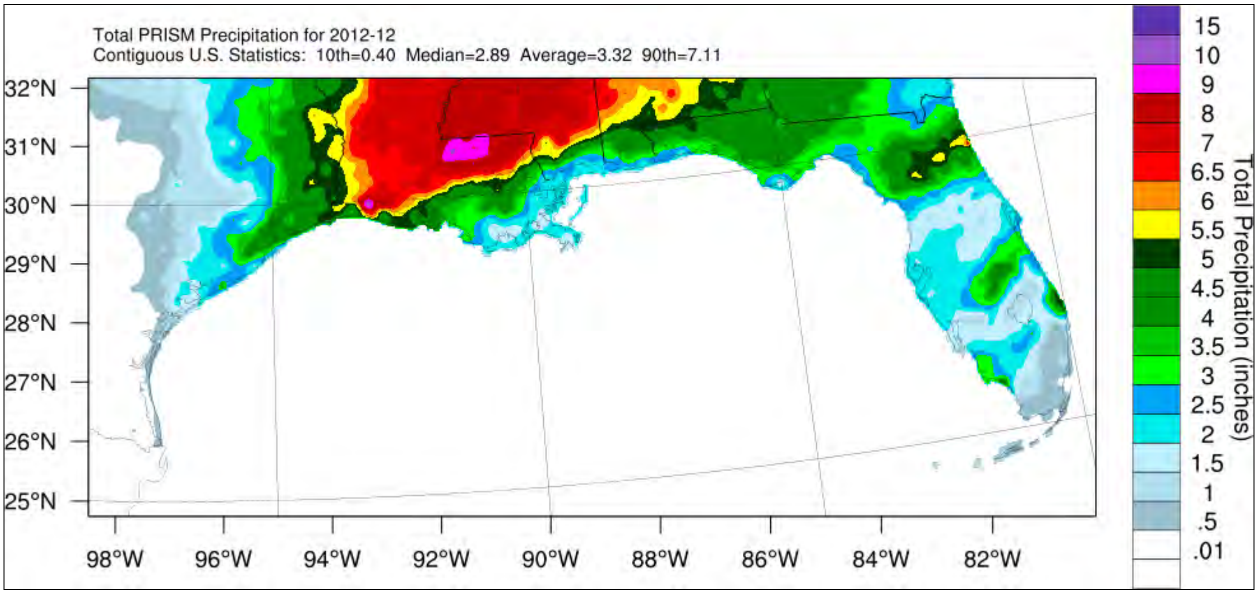


Figure F-33.   November 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.



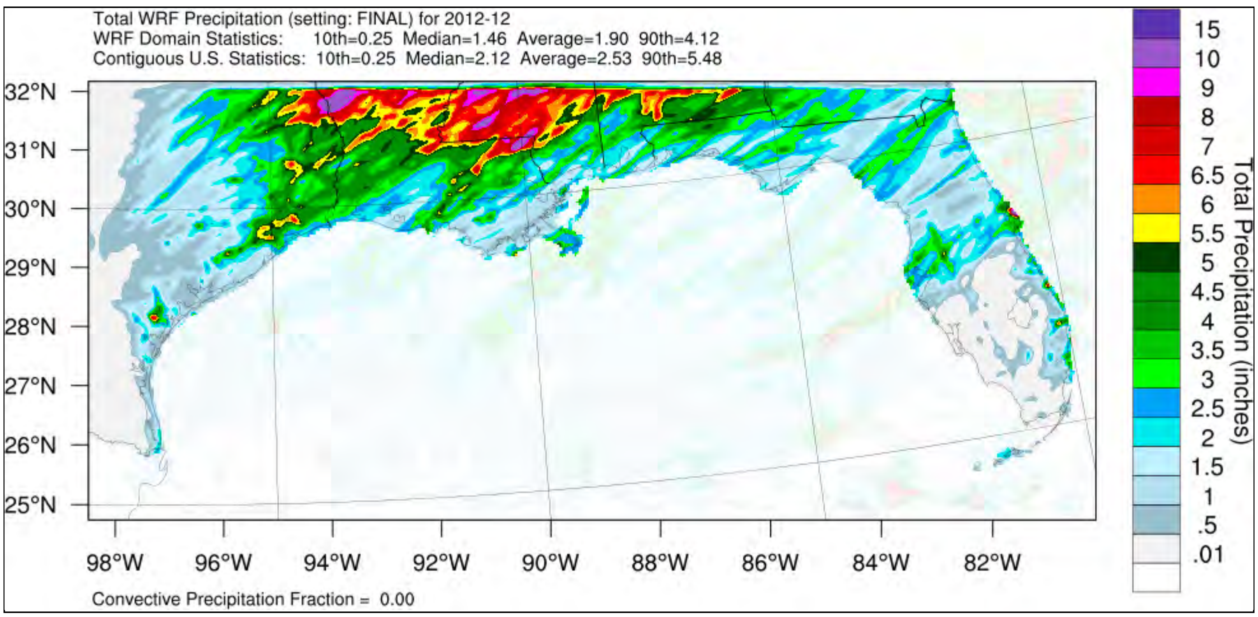


Figure F-34. December 2012 PRISM Precipitation (top) and WRF Precipitation (bottom), 4-km Domain.

F.3.4.2 Evaluation Over Water Using Satellite Precipitation

In this analysis, WRF precipitation data are also compared to TRMM satellite precipitation data to assess the accuracy of the WRF precipitation. Ramboll Environ re-projected and aggregated the TRMM data to the WRF projection’s grid cell locations, and the resulting gridded data was plotted and the gridded fields saved. This allows for a consistent visual qualitative comparison, although the 0.5 degree (~55 km) TRMM dataset is at a lower resolution than the 4-km PRISM dataset and as a result, the satellite precipitation fields appear much coarser in the 4-km domain. Additionally, near the end of the WRF modeling period, the satellite hosting the TRMM sensor ran out of propellant. This caused its orbit to slowly decay, casting into doubt the validity of the derived rainfall quantities and is the reason only a qualitative comparison is presented below. Below, **Figures F-35 through F-46** show monthly WRF precipitation averages compared to TRMM precipitation averages throughout 2012 in the 12-km domain.

The WRF under-predicts precipitation over the offshore portions of the domain, compared to TRMM for the averaging months of January through May, as shown in **Figures F-35 through F-39**. From June through October, WRF performs well at predicting precipitation spatially and numerically, shown in **Figures F-40 through F-44**. The increased amount of rainfall over the southeast Gulf Coast States, stretching out over the coastlines, is well represented through the summertime months. The WRF slightly under-predicts the amount of rainfall in the offshore portions of the Gulf, compared to the TRMM precipitation averages for November and December, shown in **Figures F-45 and F-46**. Even with the coarse TRMM resolution, it appears the model has a slight dry bias in the over-water portions of the domain in the colder months.

Given the coarser resolution of the TRMM plots, WRF tends to under-forecast precipitation intensity overall in the offshore portions of the Gulf throughout the winter and spring months and does a satisfactory job at forecasting the amount of rainfall over water in the summer and fall months in the 4-km domain.

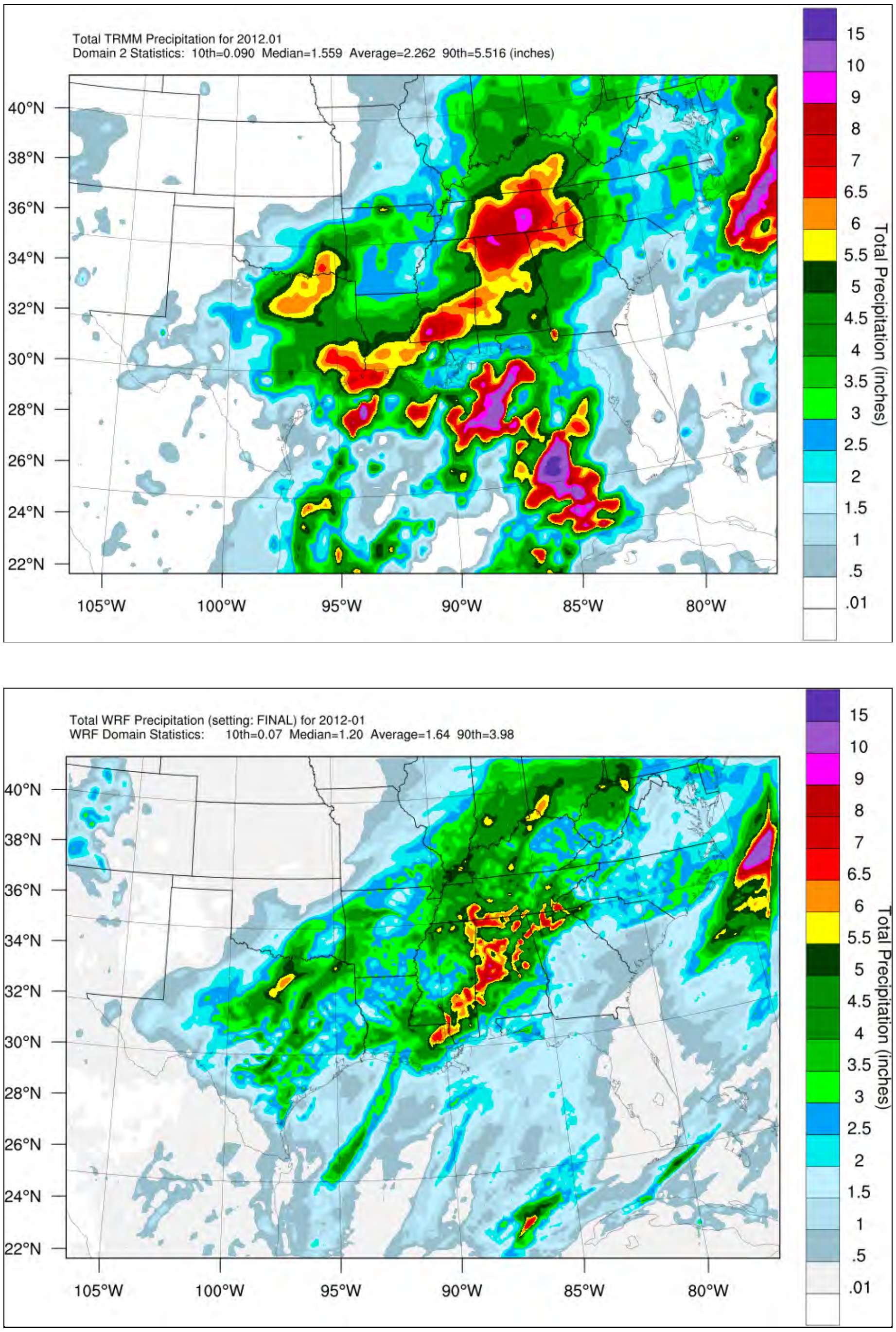
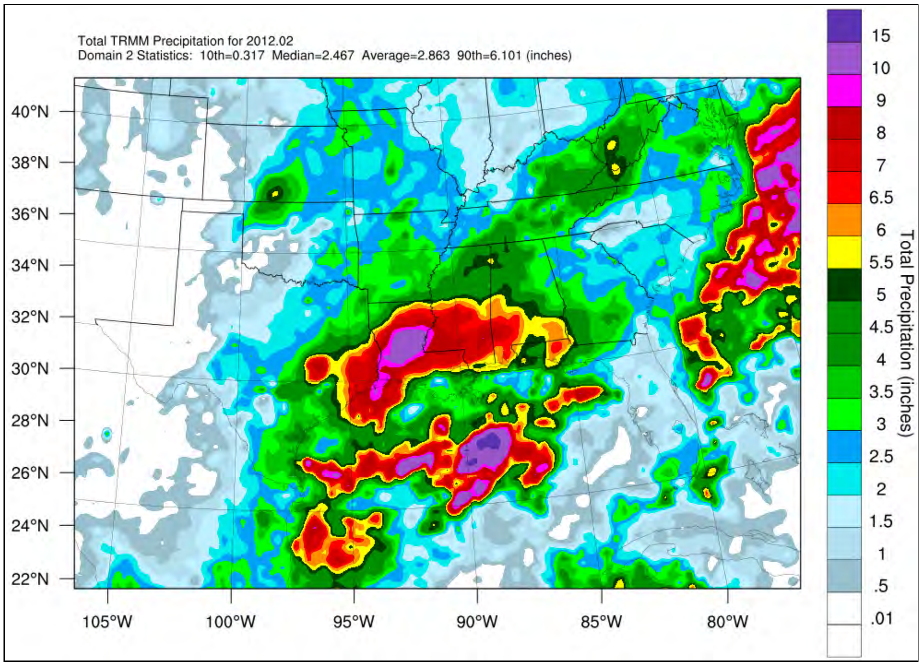


Figure F-35. January 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.



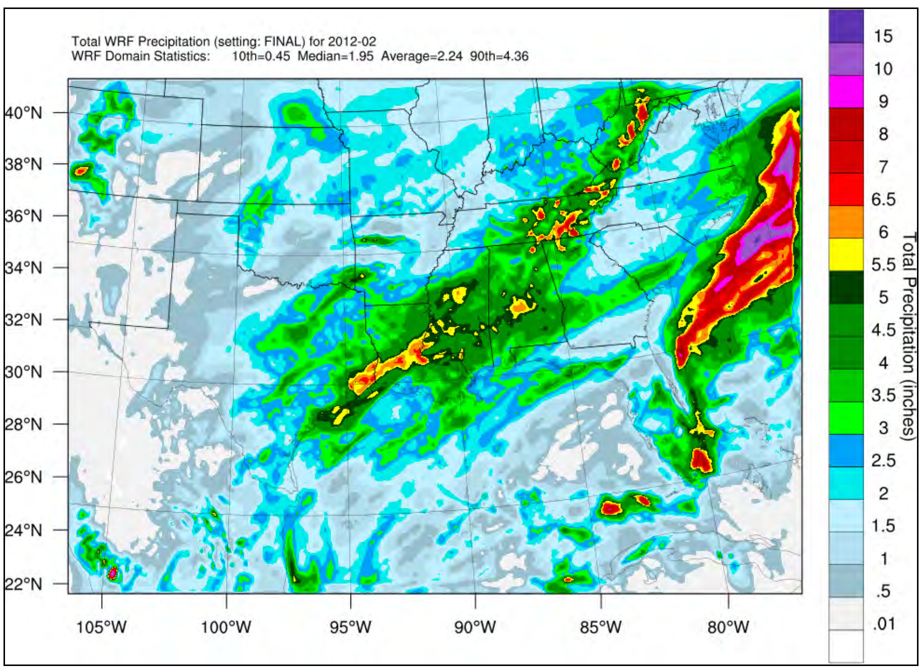


Figure F-36. February 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.

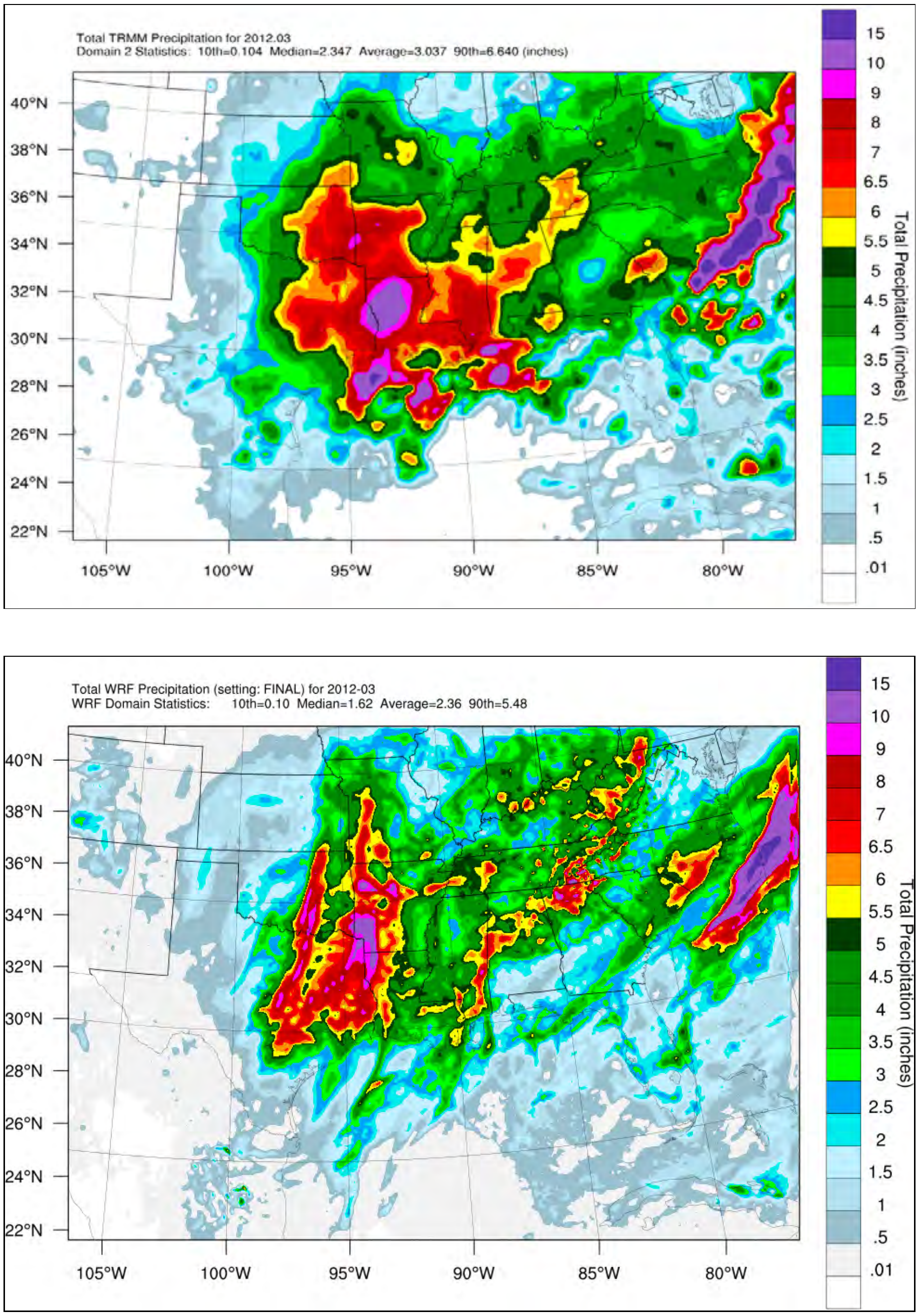
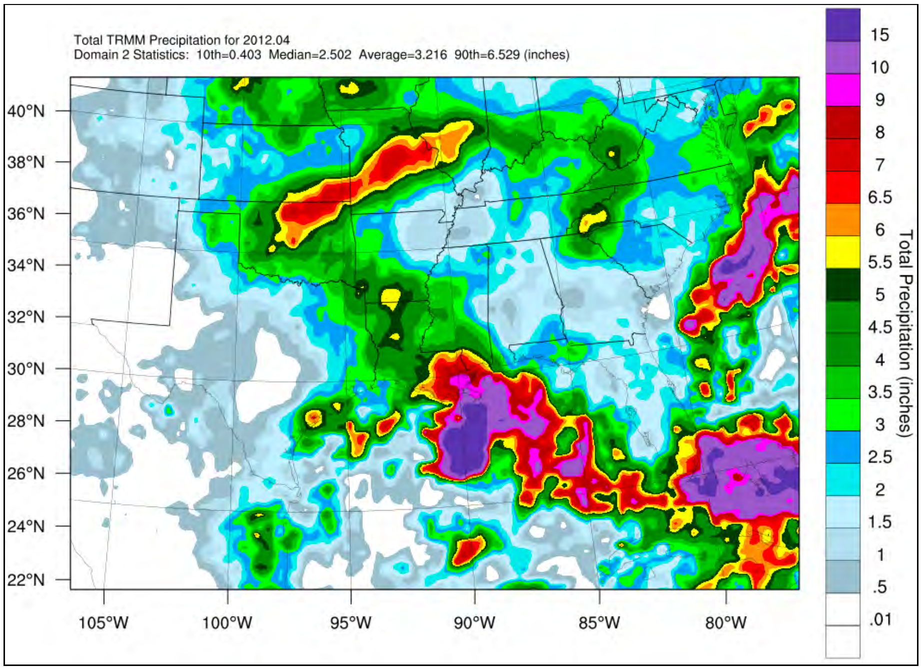


Figure F-37. March 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.



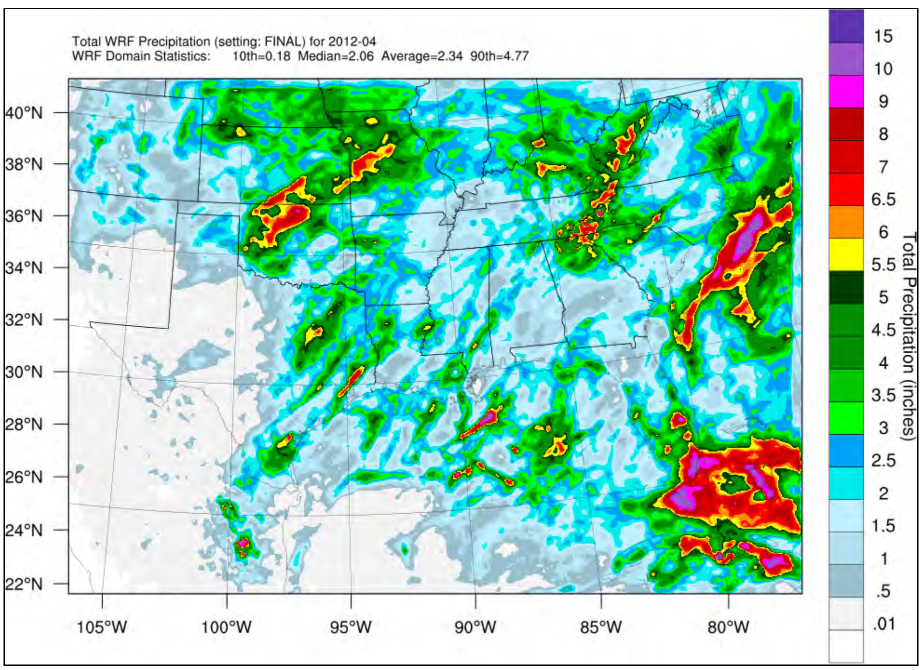
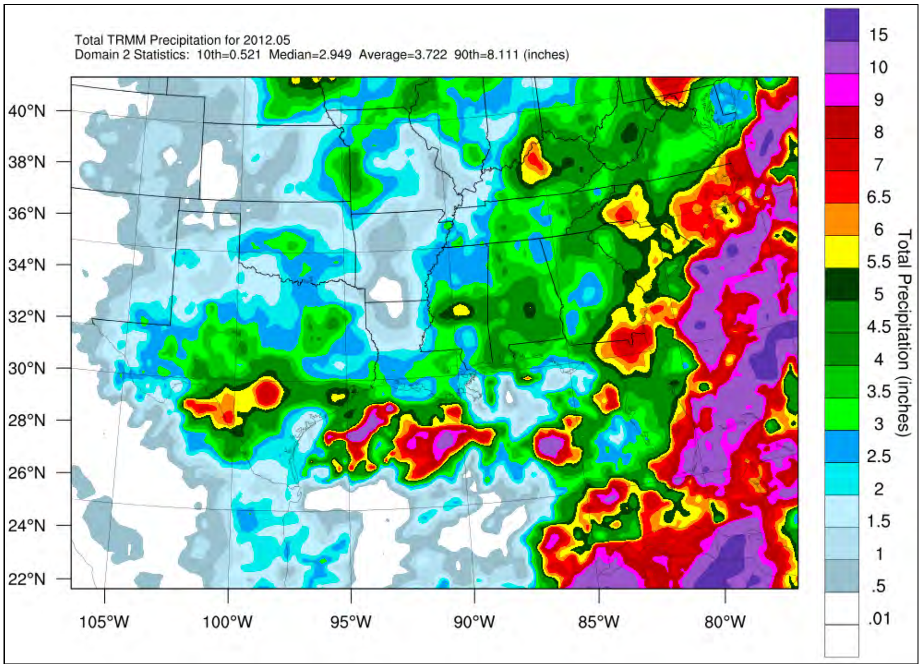


Figure F-38. April 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.



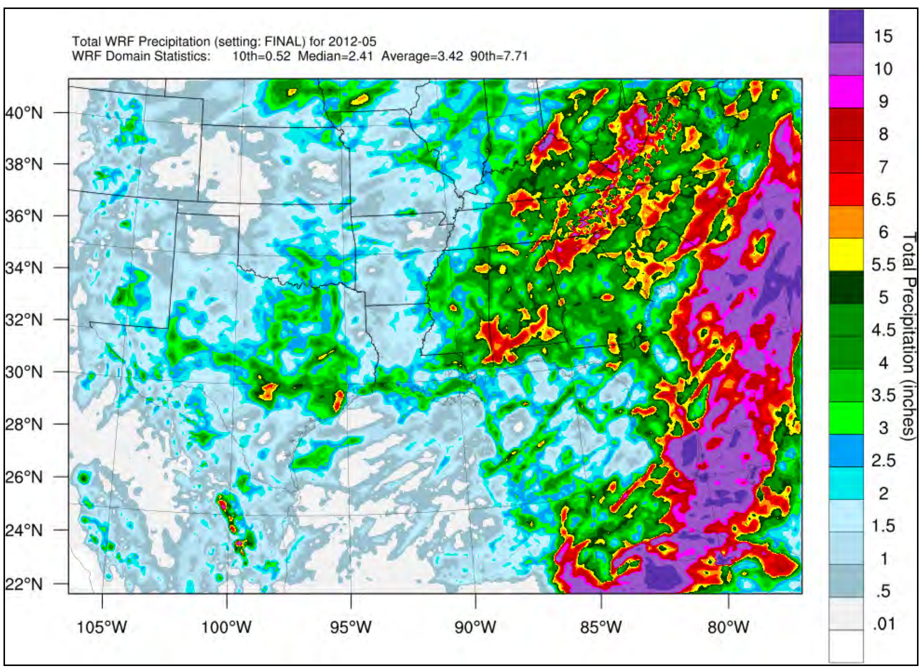
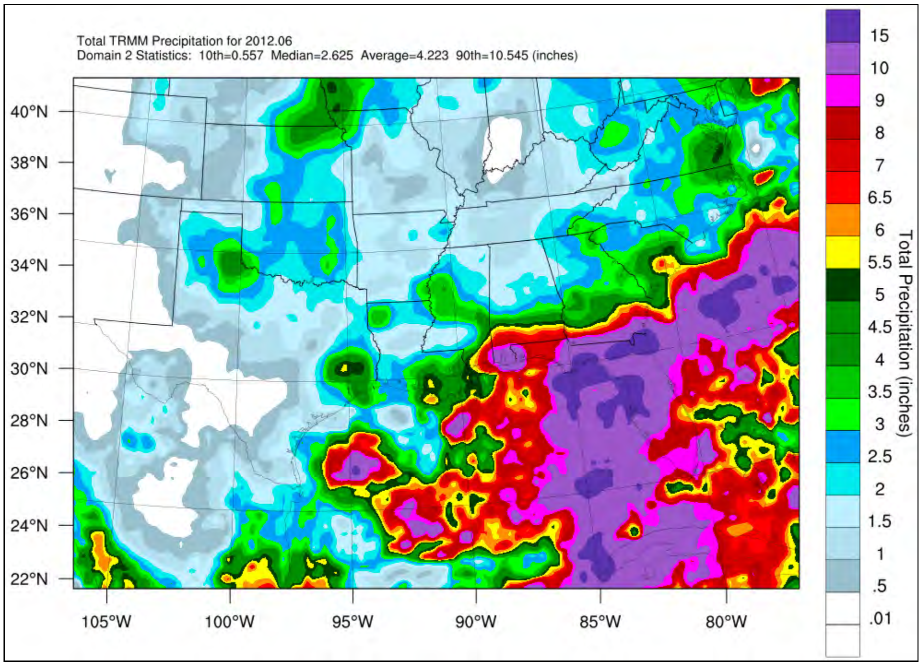


Figure F-39. May 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.



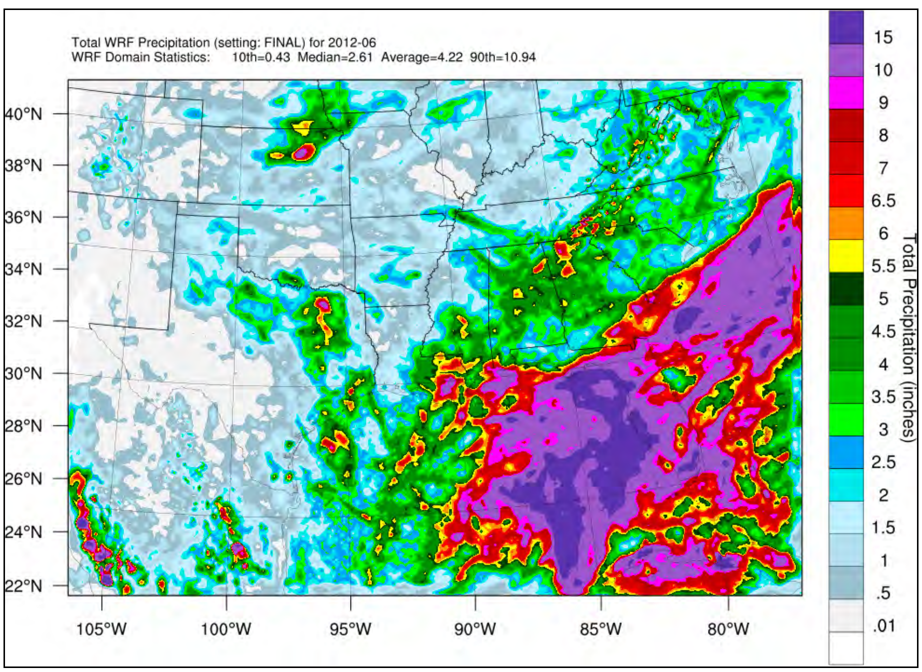
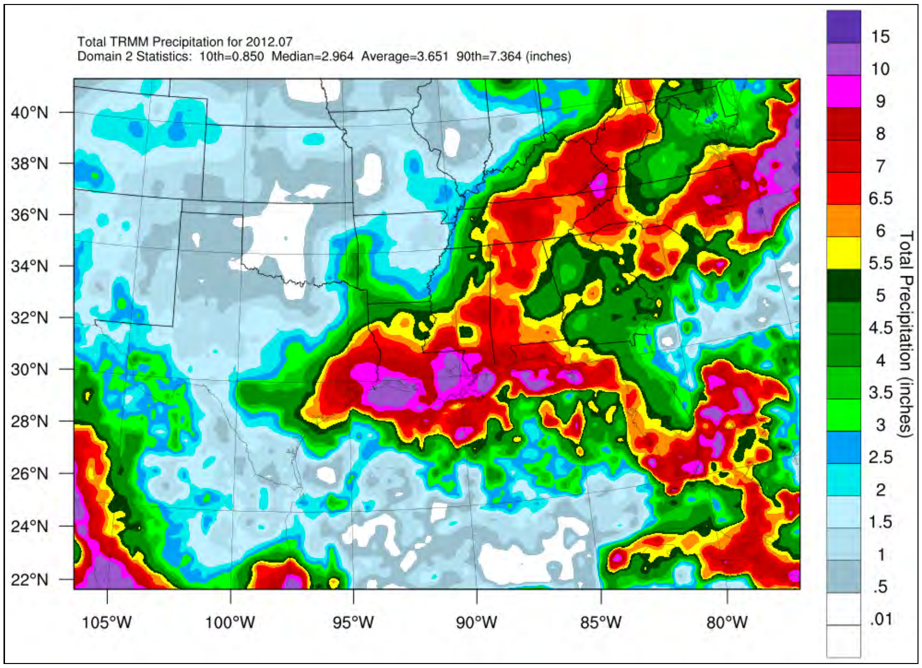


Figure F-40. June 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.



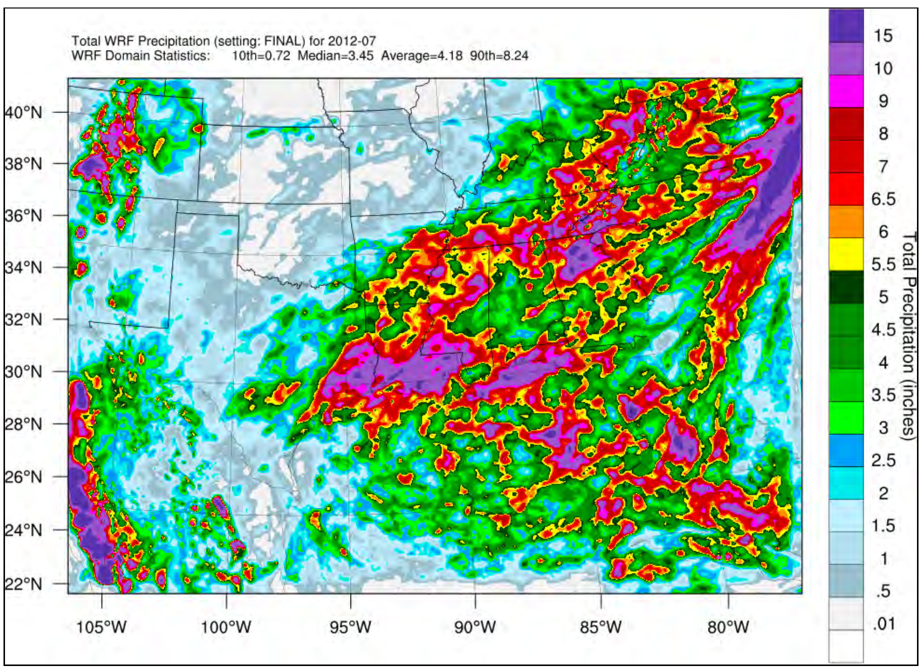


Figure F-41. July 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.

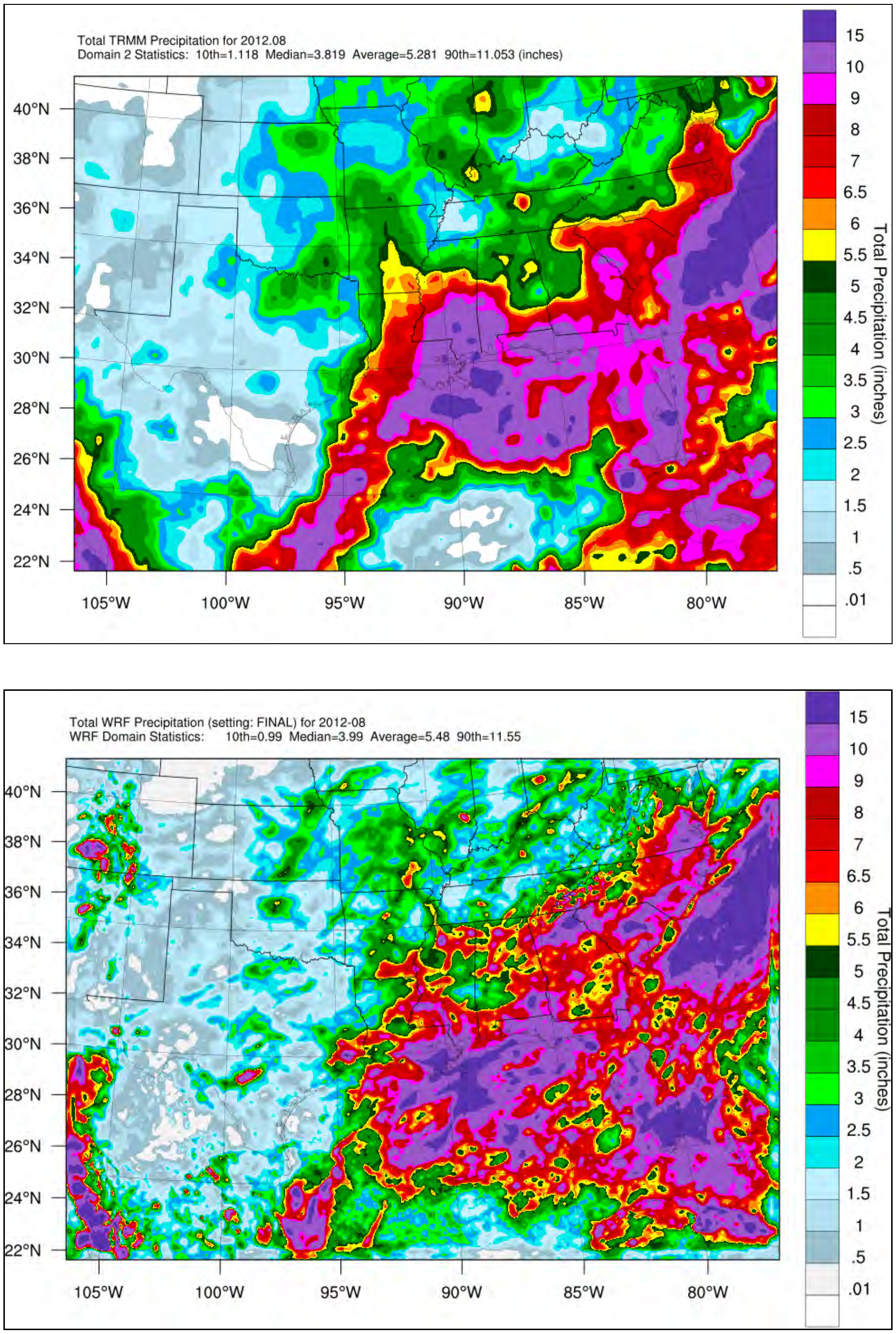
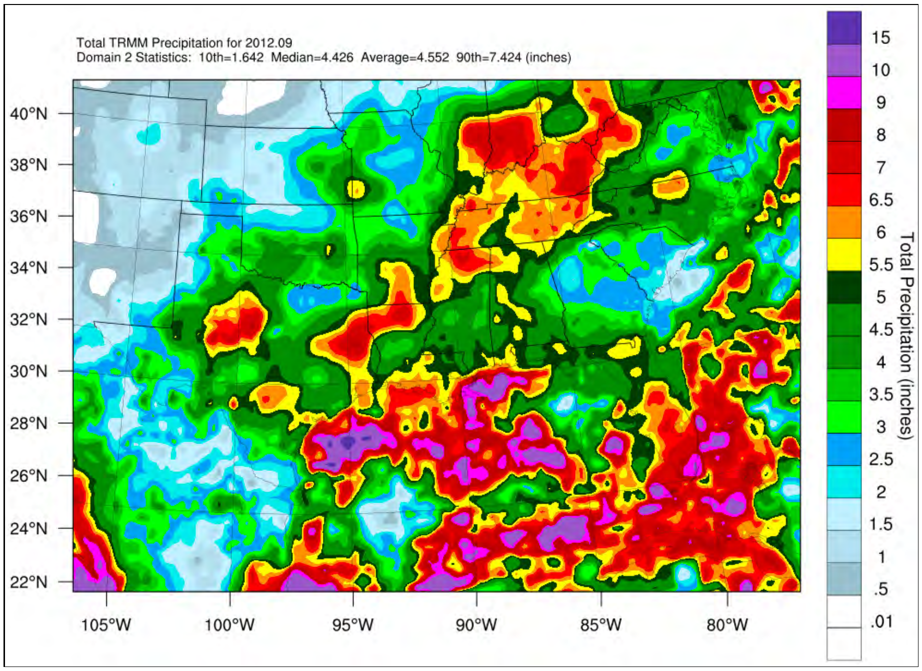


Figure F-42. August 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.



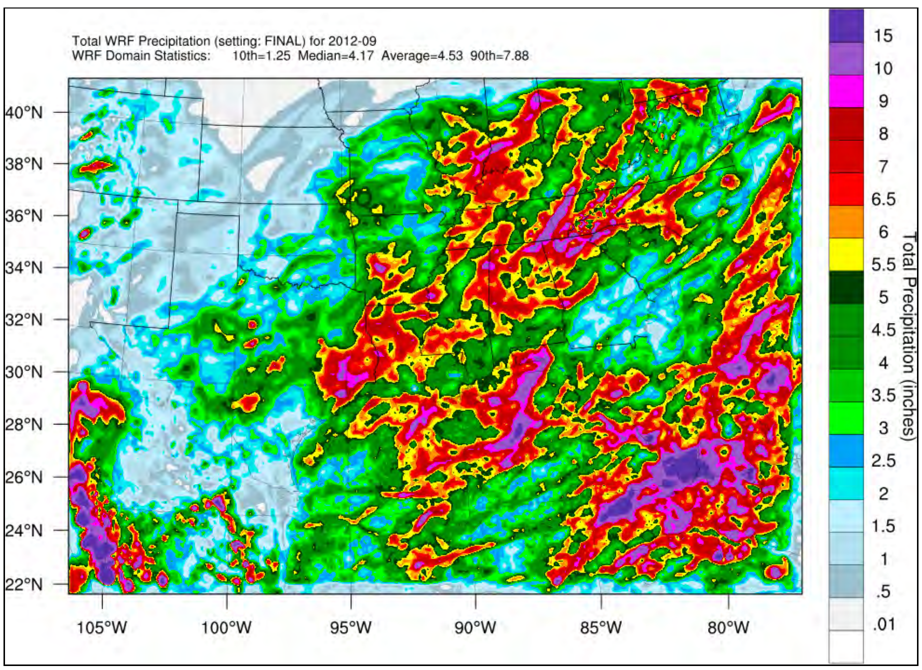
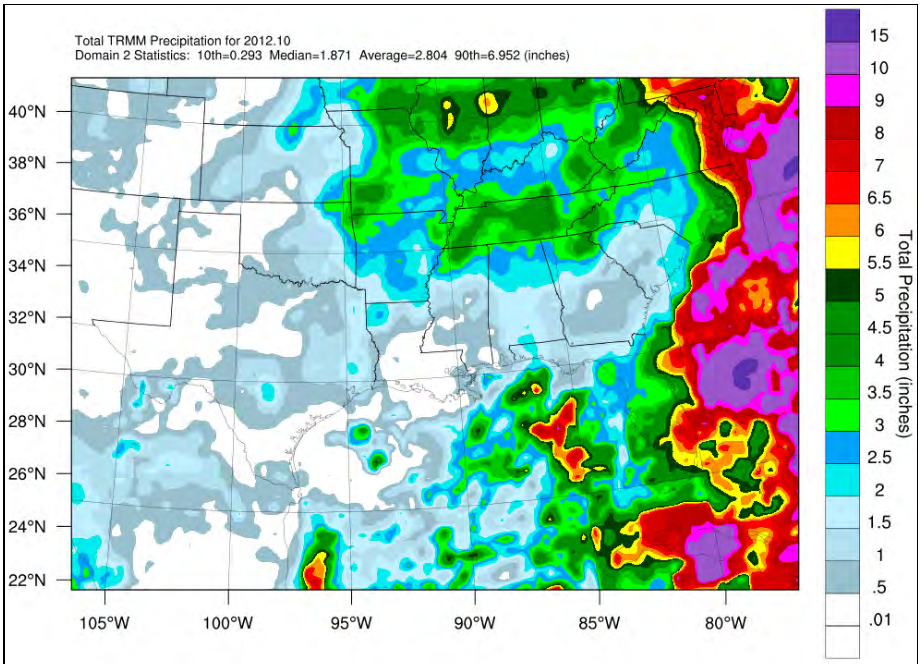


Figure F-43. September 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.



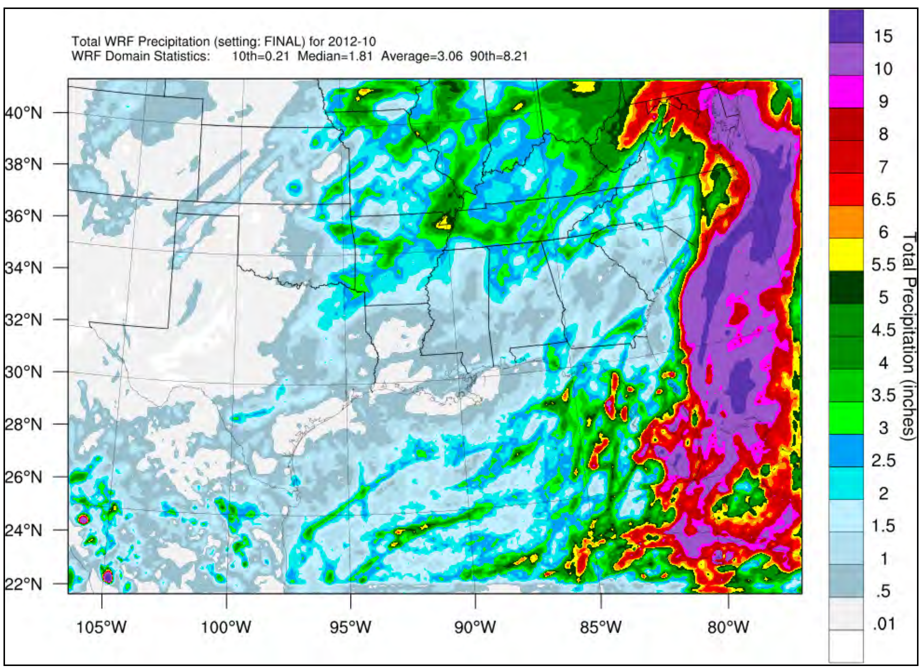


Figure F-44. October 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.

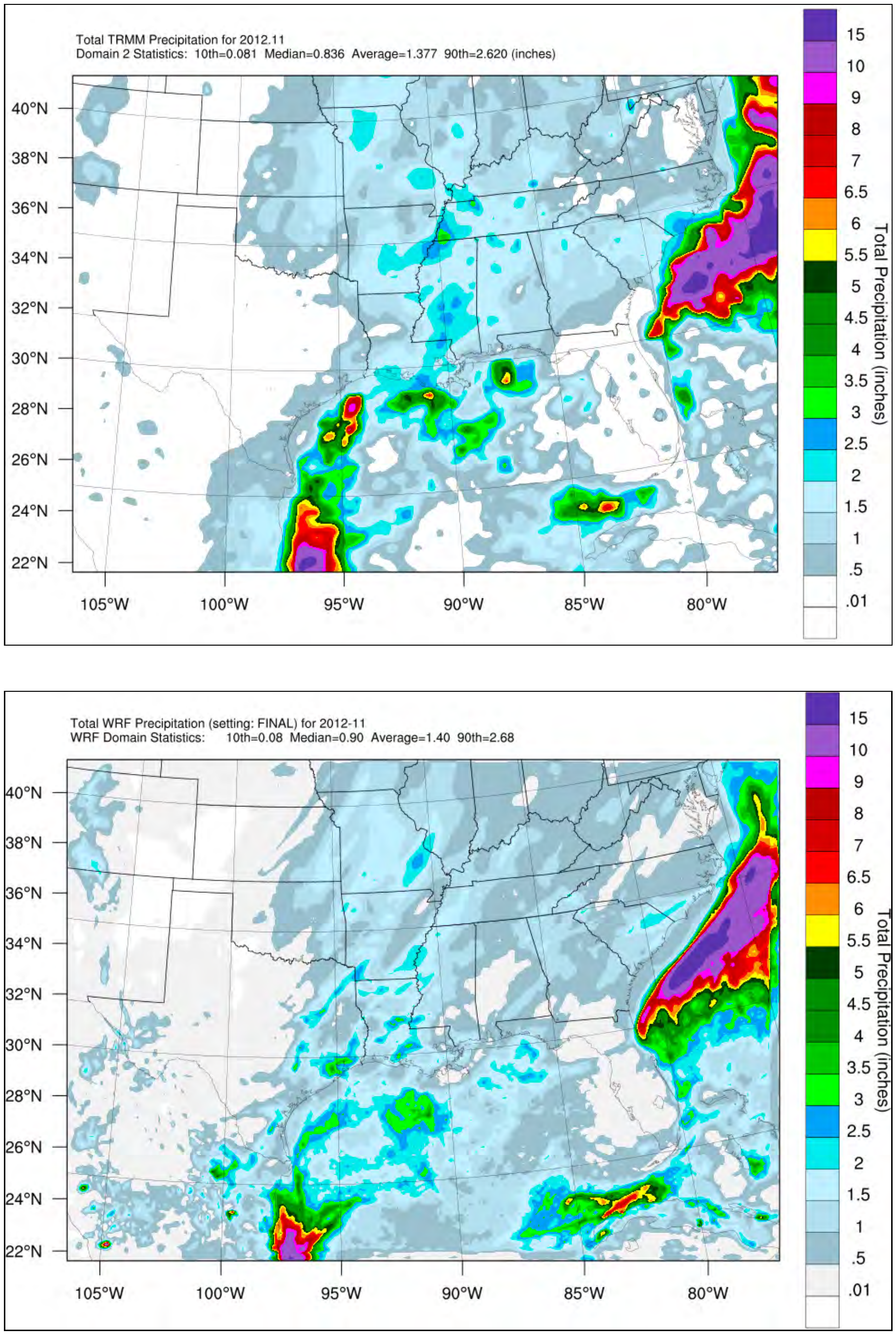
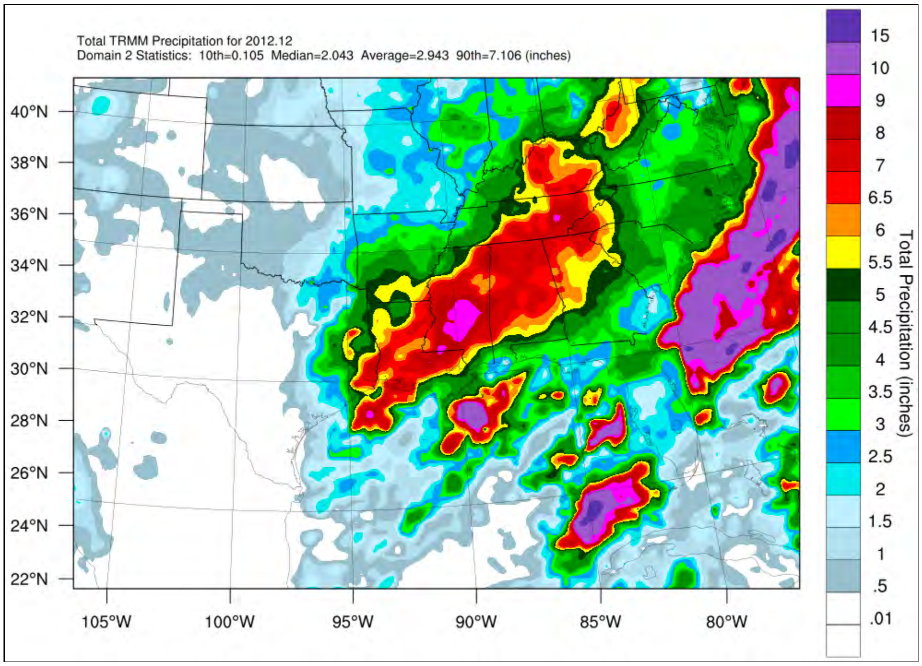


Figure F-45. November 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.



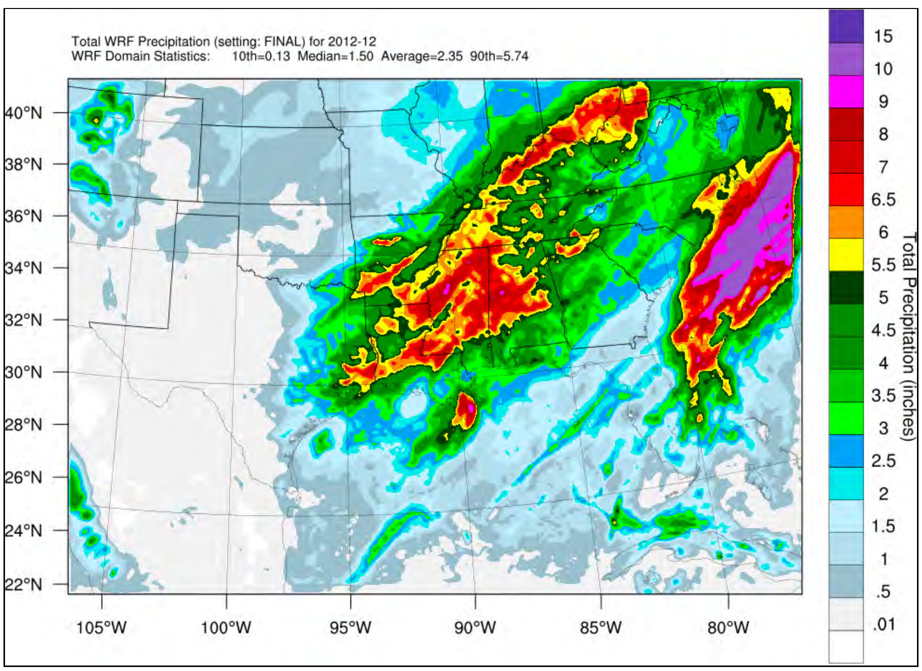


Figure F-46. December 2012 TRMM Precipitation Average (top) and Corresponding WRF Precipitation Average (bottom) in the 12-km Domain.

F.3.4.3 Evaluation Using Tropical Cyclone Precipitation Events

In order to evaluate the accuracy of the WRF model for precipitation performance, short-term rainfall events were also analyzed for local and regional scale impacts. Daily precipitation plots were created for every 24-hour period from the WRF, PRISM and TRMM databases. Tropical cyclone events were chosen as each storm system typically produces a wide area of enhanced rainfall for both onshore and offshore areas.

A tropical cyclone is a warm-core, non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, with organized deep convection and a closed surface wind circulation about a well-defined center (NHC, 2015). Increased rainfall events from two cyclones, Hurricane Isaac and Tropical Storm Debby, are presented in a qualitative comparison.

Hurricane Isaac made landfall along the coast of southern Louisiana on August 29, 2012, and moved northward, where it was downgraded to a tropical storm on August 30th. Daily precipitation plots from each dataset on August 30th are shown in **Figure F-47**. The WRF depicts the large cyclonic rotation and enhanced precipitation bands from Isaac over southeast Louisiana very well, compared to the PRISM dataset. Compared to TRMM, the model does appear to over-forecast the rainfall intensity for this 24-hour period.

Figure F-48 shows daily precipitation plots as Tropical Storm Debby's outer rain bands begin to impact Florida's west coast on June 25, 2012. The WRF performed very well in comparison to both PRISM and TRMM, forecasting the spatial extent of the large storm throughout the eastern Gulf of Mexico. The model did slightly under-predict the rainfall accumulations in this 24-hour period, compared to the observational and satellite databases.

Overall, WRF performed very well in recreating the daily precipitation events in these two scenarios. The daily precipitation plots from each WRF, PRISM and TRMM dataset are available by request from Ramboll Environ.

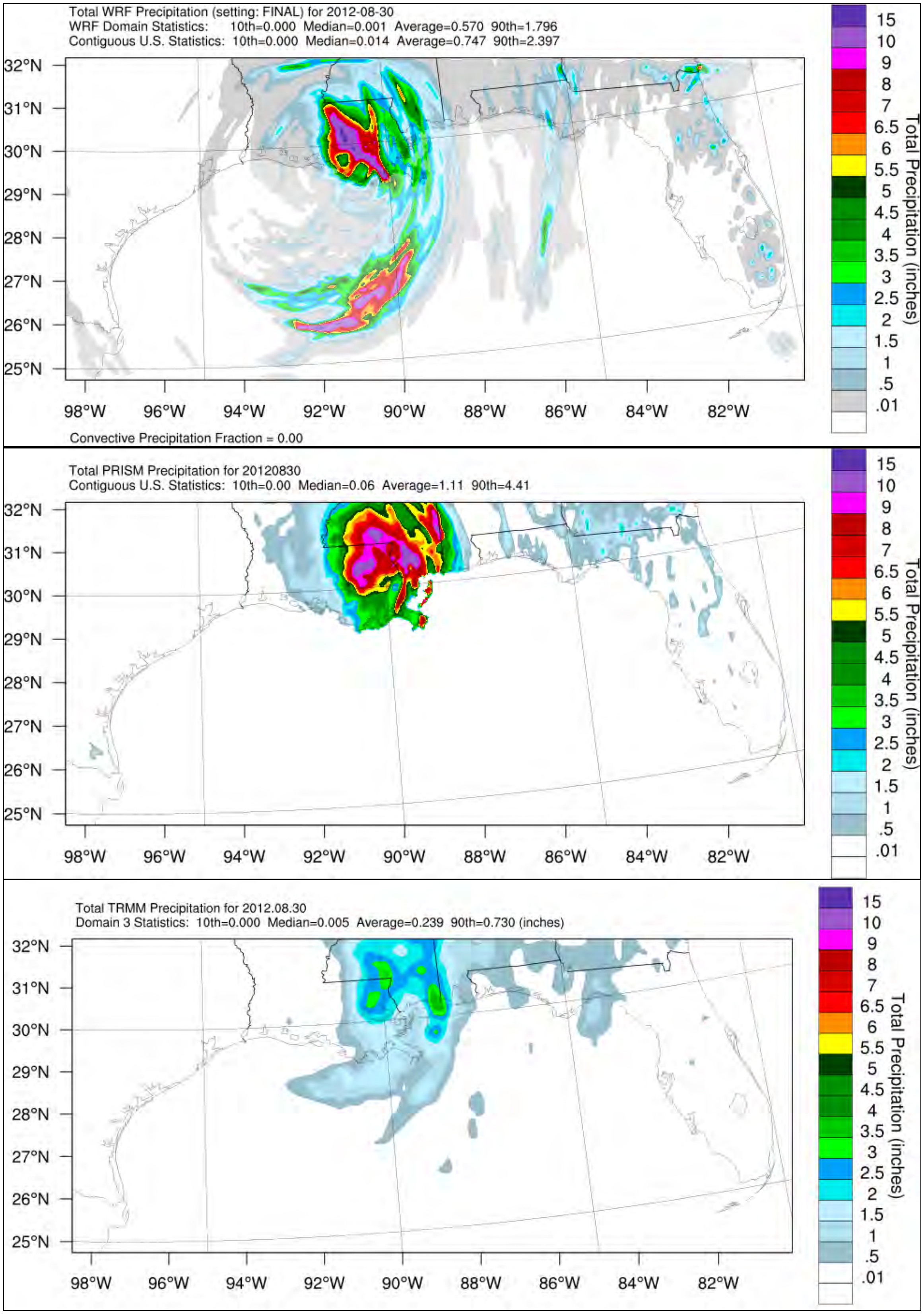


Figure F-47. Daily Precipitation Plots from WRF, PRISM, and TRMM on August 30, 2012.

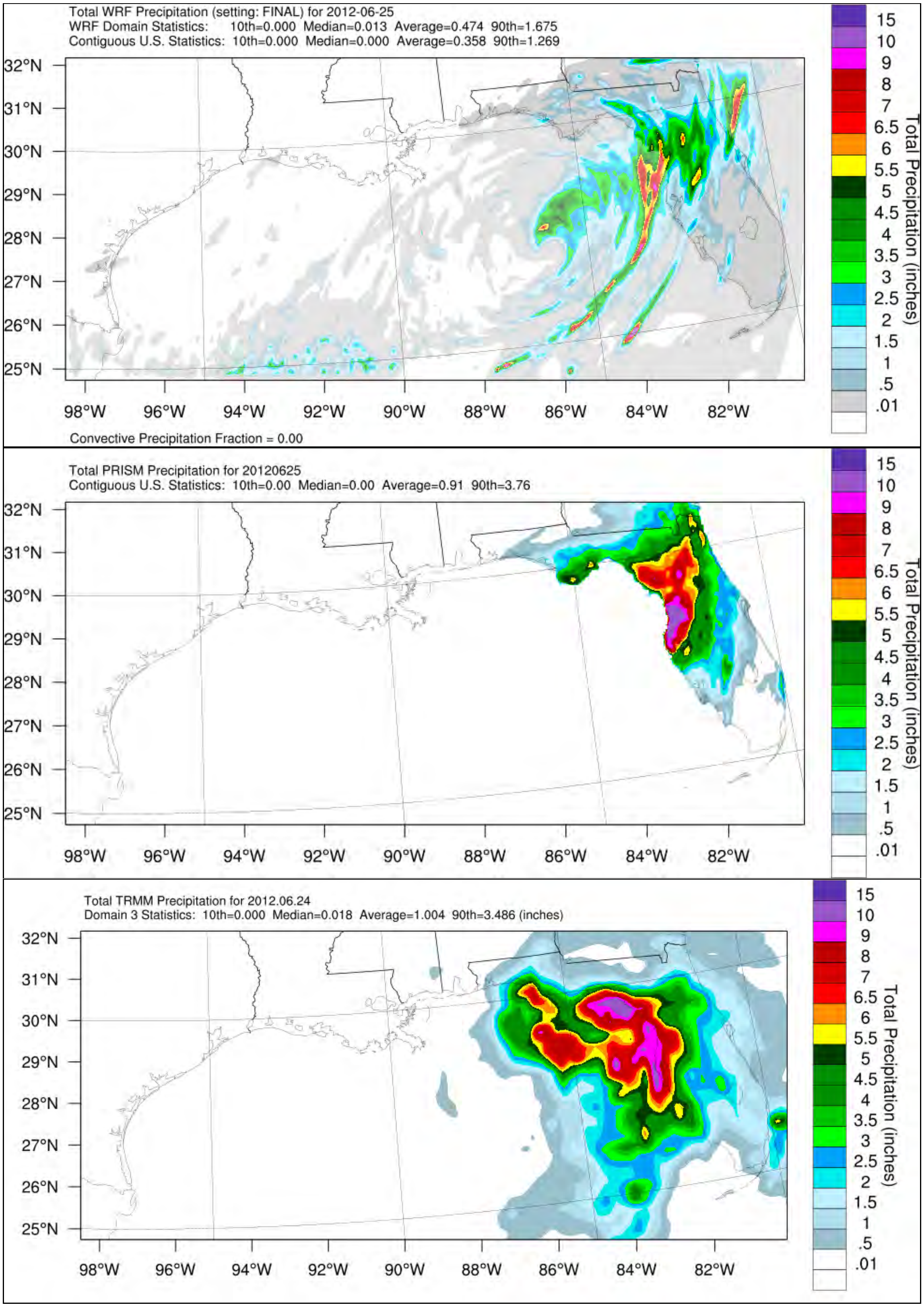


Figure F-48. Daily Precipitation Plots from WRF, PRISM, and TRMM Databases on June 25, 2012.

F.4 SUMMARY AND CONCLUSIONS

The BOEM Gulf of Mexico OCS Region WRF meteorological model simulation for January through December 2012 reproduced the observed surface and upper-air meteorological variables very well. The WRF performed exceptionally well in the onshore METSTAT analysis for the 36-km and 12-km domains and well in the onshore and offshore analysis for the 4-km domain, with a small bias in wind direction. This performance shows a very strong agreement overall between the model and surface observations.

Comparisons of selected wind roses along the Gulf Coast, which will be presented in the full WRF model evaluation, show WRF was able to forecast the offshore and onshore wind speed and wind direction very well in the 4-km domain. This suggests the model was able to accurately reproduce the land-sea breeze circulation.

Upper air performance in the 4-km (d03) domain for the two selected locations throughout the Gulf of Mexico reflects accurate predictions of the vertical atmosphere, as shown in comparisons between WRF and radiosonde data, especially in mixing layer heights and cases of surface-based temperature inversions.

The monthly precipitation analysis for the 4-km (d03) domain indicates there is a strong agreement between the model and observation-based precipitation measurements over land, including convergence zone and enhanced rainfall areas. The comparison with the 12-km (d02) WRF and satellite-based precipitation accumulations does indicate some understatement of precipitation over water, most notably in the winter months.

Based on our experience, the BOEM Gulf of Mexico OCS Region WRF modeling's superior performance throughout 2012 provides a substantial basis for developing meteorological inputs for air quality modeling in the Gulf of Mexico region.

F.5 REFERENCES

Brashers, B. and C. Emery. 2015. The Mesoscale Model Interface Program (MMIF), Version 3.2, 2015-07-24, Draft User's Manual. Prepared for USEPA, Office of Air Quality Planning and Standards. Ramboll Environ US Corporation (Ramboll Environ). Internet website: http://www.epa.gov/ttn/scram/models/relat/mmif/MMIFv3.2_Users_Manual.pdf.

Brashers, B., J. Knapik, and R. Morris. 2014. Official communication. Technical memorandum concerning BOEM Contract No. M14PC00007, Task 2 WRF Meteorological Model Dataset Assessment for the Air Quality Modeling in the Gulf of Mexico Region to Holli Ensz, Bureau of Ocean Energy Management, Gulf of Mexico Region. Prepared by ENVIRON International Corporation, Lynnwood, WA.

Daly, C., M. Halbleib, J.I. Smith, W.P. Gibson, M.K. Doggett, G.H. Taylor, J. Curtis, and P.P. Pasteris. 2008. Physiographically sensitive mapping of climatological temperature and precipitation across the conterminous United States. International Journal of Climatology.

Internet website: http://prism.nacse.org/documents/Daly2008_PhysiographicMapping_IntJnlClim.pdf.

Emery, C.A., E. Tai, and G. Yarwood. 2001. Enhanced Meteorological Modeling and Performance Evaluation for Two Texas Ozone Episodes. Prepared for the Texas Natural Resource Conservation Commission (now TCEQ) by ENVIRON International Corp, Novato, CA. Internet website: http://www.tceq.texas.gov/assets/public/implementation/air/am/contracts/reports/mm/EnhancedMetModelingAndPerformanceEvaluation.pdf.

Gilliam, R.C. and J.E. Pleim. 2010. Performance assessment of new land-surface and planetary boundary layer physics in the WRF-ARW. Journal of Applied Meteorology and Climatology 49, 760-774.

Kemball-Cook, S., Y. ia, C. Emery, and R. Morris. 2005. Alaska MM5 Modeling for the 2002 Annual Period to Support Visibility Modeling. Prepared for the Western Regional Air Partnership, by ENVIRON International Corp., Novato, CA. Internet website: http://pah.cert.ucr.edu/aqm/308/docs/alaska/Alaska_MM5_DraftReport_Sept05.pdf.

McNally, D.E. 2009. 12 km MM5 Performance Goals. Presentation to the Ad-Hoc Meteorology Group. June 25, 2009. Internet website: http://www.epa.gov/scram001/adhoc/mcnally2009.pdf.

NCAR. 2015. National Center for Atmospheric Research. Retrieved from http://www2.mmm.ucar.edu/wrf/users/download/get_source.html.

Ramboll Environ US Corp. 2015. METSTAT. Internet website: http://www.camx.com/download/support-software.aspx.

Saha, S., S. Moorthi, X. Wu, J. Wang, S. Nadiga, P. Tripp, D. Behringer, Y-T. Hou, H-y. Chuang, M. Iredell, M. Ek, J. Meng, R. Yang, M. Peña Mendez, H. van den Dool, Q. Zhang, W. Wang, M. Chen, and E. Becker. 2014. The NCEP Climate Forecast System Version 2. Journal of Climate 27, 2185-2208. doi:http://dx.doi.org/10.1175/JCLI-D-12-00823.1.

SCAS-OSU. 2001. Climate Mapping with PRISM. Oregon State University (OSU)

U.S.Dept. of Commerce, National Oceanic and Atmospheric Administration, Earth System Research Laboratory. 2015. NOAA/ESRL Radiosonde Database. Internet website: www.esrl.noaa.gov/raobs.

U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Climatic Data Center. 2014. NOAA NCDC Integrated Surface Database. Internet website: www.ncdc.noaa.gov/isd.

APPENDIX G

AIR QUALITY:
EMISSIONS FOR THE CUMULATIVE AND VISIBILITY IMPACTS

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G AIR QUALITY: EMISSIONS FOR THE CUMULATIVE AND VISIBILITY IMPACTS

G.1 INTRODUCTION

The U.S. Department of the Interior's Bureau of Ocean Energy Management (BOEM) is required under the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. § 1334(a)(8)) to comply with the National Ambient Air Quality Standards (NAAQS) to the extent that Outer Continental Shelf (OCS) offshore oil and gas exploration, development, and production sources do not significantly affect the air quality of any state. The Gulf of Mexico OCS Region's OCS area of possible influence includes the States of Texas, Louisiana, Mississippi, Alabama, and Florida. BOEM's Gulf of Mexico OCS Region manages the responsible development of oil, gas, and mineral resources for the 430 million acres in the Western, Central, and Eastern Planning Areas on the OCS comprising the Gulf of Mexico OCS Region, including the areas under moratoria (shown in **Figure G-1**). The Clean Air Act Amendments (CAAA) of 1990 designate air quality authorities in the Gulf of Mexico OCS Region, giving BOEM air quality jurisdiction westward of 87°30'W. longitude and the U.S. Environmental Protection Agency (USEPA) air quality jurisdiction eastward of 87°30'W. longitude. In 2006, oil and gas leasing operations within 125 miles (201 kilometers [km]) of the Florida coastline were banned until 2022 under the Gulf of Mexico Energy Security Act (GOMESA). The GOMESA moratoria area is depicted on **Figure G-1**.

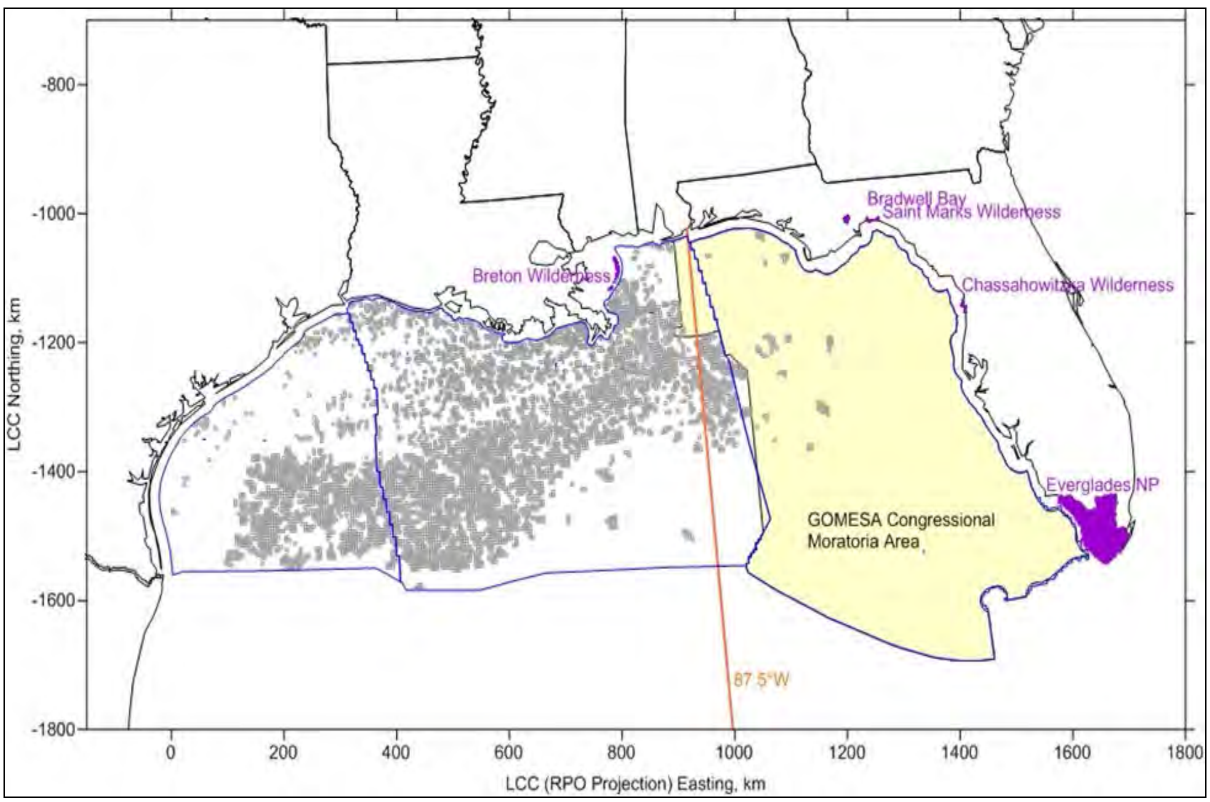

Figure G-1. Location of the "Air Quality Modeling in the Gulf of Mexico Region" Study, with Class I Areas (purple) and Platform Locations (gray dots).

The USEPA has set NAAQS for six regulated air quality pollutants: ozone; particulate matter with an aerodynamic diameter of 2.5 micrometers and smaller ($PM_{2.5}$); particulate matter with an aerodynamic diameter of 10 micrometers and smaller (PM_{10}); sulfur dioxide (SO_2); nitrogen dioxide (NO_2); carbon monoxide (CO); and lead (Pb). After promulgation of a NAAQS, the USEPA designates areas that fail to achieve the NAAQS as nonattainment areas (NAAs) and States are required to submit State Implementation Plans (SIPs) to the USEPA that contain emission control plans and a demonstration that the NAA will achieve the NAAQS by the required date. After an area comes into attainment of the NAAQS, the area can be redesignated as a maintenance area and must continue to demonstrate compliance with the NAAQS.

In 1997, the USEPA promulgated the first 8-hour ozone NAAQS with a threshold of 0.08 parts per million (ppm) (84 parts per billion [ppb]). On March 12, 2008, the USEPA promulgated a more stringent 0.075 ppm (75 ppb) 8-hour ozone NAAQS. **Figure G-2** presents the current ozone nonattainment areas in the southeastern U.S. On October 1, 2015, the USEPA strengthened the 8-hour NAAQS for ozone to 0.07 ppm (70 ppb). Under this more stringent ozone NAAQS, there may be more areas in the southeastern U.S. that will be in nonattainment. The USEPA plans to make attainment and nonattainment designations for the revised standards by late 2017, with the designations based on 2014-2016 air quality data.

On December 14, 2012, the USEPA revised the $PM_{2.5}$ primary NAAQS by lowering the annual $PM_{2.5}$ NAAQS threshold from 15.0 micrograms per cubic meter ($\mu g/m^3$) to 12.0 $\mu g/m^3$. The USEPA retained the 24-hour $PM_{2.5}$ primary NAAQS at 35 $\mu g/m^3$. The 24-hour coarse PM NAAQS (PM_{10}) was also retained at 150 $\mu g/m^3$.

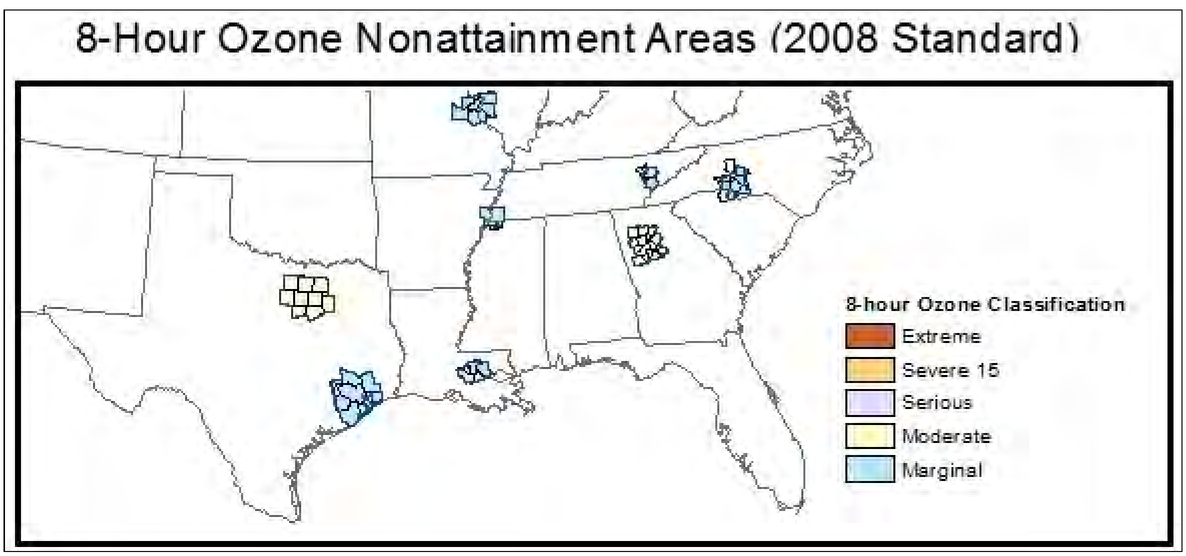

Figure G-2. Ozone Nonattainment Areas in the Southeastern U.S. (USEPA, 2016a).

In February 2010, the USEPA issued a new 1-hour NO_2 NAAQS with a threshold of 100 ppb (98th percentile daily maximum average over 3 years) and a new 1-hour SO_2 NAAQS was promulgated in June 2010 with a threshold of 75 ppb (99th percentile averaged over 3 years). The USEPA has not yet designated the nonattainment areas for the 1-hour NO_2 and 1 hour SO_2 NAAQS.

A new lead NAAQS was issued in 2008; NAAs for lead are associated with specific industrial sources. The NAAQS for carbon monoxide has remained essentially unchanged since it was originally promulgated in 1971. As of September 27, 2010, all NAAs for carbon monoxide have been redesignated as maintenance areas. **Table G-1** summarizes the nonattainment and maintenance areas in the southeastern U.S.

Table G-1. Nonattainment and Maintenance Areas in the Southeastern U.S.

State	Area	8-hr O_3 (1997)	8-hr O_3 (2008)	SO_2 (2010)	Lead (2008)
Alabama	Troy, AL				NAA[a]
Florida	Tampa, FL				NAA
	Hillsborough County, FL			NAA	
	Nassau County, FL			NAA	
Louisiana	Baton Rouge, LA	M[b]	NAA		
	St. Bernard Parish, LA			NAA	
Texas	Beaumont-Port Arthur, TX	M			
	Houston-Galveston-Brazoria, TX	NAA	NAA		
	Frisco, TX				NAA

[a] NAA = nonattainment area
[b] M = maintenance area
Blank cells indicate the area is in attainment of the NAAQS.

The CAAA designated 156 Class I areas consisting of National Parks and Wilderness Areas that are offered special protection for air quality and air quality-related values (AQRVs). The Class I areas, compared to Class II areas, have lower Prevention of Significant Deterioration (PSD) air quality increments that new sources may not exceed and are protected against excessive increases in several AQRVs including visibility impairment, acid (sulfur and nitrogen) deposition, and nitrogen eutrophication. The Regional Haze Rule (RHR) has a goal of natural visibility conditions by 2064 at Class I areas, and States must submit RHR SIPs that demonstrate progress towards that goal. **Figure G-1** displays the locations of the mandatory Class I areas (in purple) in the Gulf of Mexico OCS Region. In addition to Class I areas, Federal Land Management (FLM) agencies have designated certain other areas as sensitive Class II areas for tracking PSD increment consumption and AQRV impacts.

On August 26, 2014, BOEM contracted with Eastern Research Group, Inc. (ERG) and team members Ramboll Environ US Corporation (Ramboll Environ) and Alpine Geophysics, LLC to complete a comprehensive air quality modeling study in the Gulf of Mexico OCS Region. Under BOEM Contract Number M14PC00007, air quality photochemical grid modeling (PGM) will be conducted in the Gulf of Mexico OCS Region to assess the impacts to nearby States of OCS oil and gas exploration, development, and production as required under OCSLA. This assessment is used by BOEM in the cumulative and visibility impacts analyses of the National Environmental Policy Act (NEPA) environmental impact statement (EIS), which is the *Gulf of Mexico OCSOil and Gas Lease Sales: 2017-2022; Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261—Final Multisale Environmental Impact Statement* (2017-2022 GOM Multisale EIS). These analyses address both current and proposed NAAQS.

Air quality modeling requires several input datasets, including meteorology, emissions inventories, and ambient pollutant concentrations. **Figure G-3** presents an overview of how these project datasets fit together for the "Air Quality Modeling in the Gulf of Mexico Region" study.

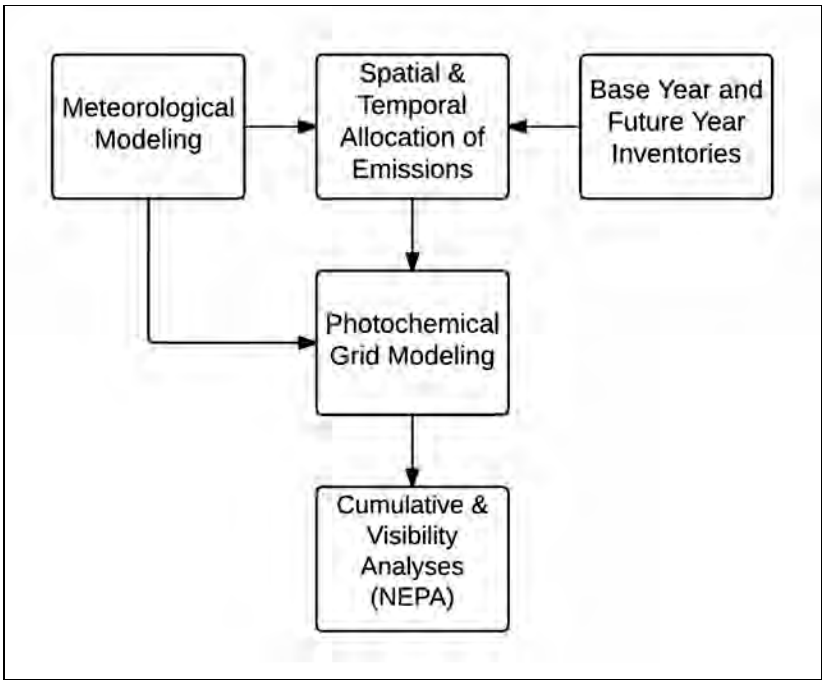

Figure G-3. Overview of the "Air Quality Modeling in the Gulf of Mexico Region" Study Tasks.

G.2 DEVELOPMENT OF EMISSION INVENTORIES

A key step in performing the "Air Quality Modeling in the Gulf of Mexico Region" study in support of the subsequent cumulative and visibility impacts analyses is development of comprehensive air emission inventories that accurately depict the base case emissions within the study area, and emissions associated with the 2017-2022 GOM Multisale EIS scenario (the future year).

The scope of the air pollutant emissions inventory development effort for the "Air Quality Modeling in the Gulf of Mexico Region" study includes selection of pollutants, base case year, geographical domain, sources, spatial resolution, temporal resolution, speciation, and development of the base case and future year emission estimates. These elements are described below.

G.2.1 Pollutants

Pollutants for the "Air Quality Modeling in the Gulf of Mexico Region" study consist of criteria air pollutants as defined by CAA Title I: CO; lead; NO_x (stated as equivalent mass of nitrogen dioxide [NO_2]); $PM_{2.5}$; PM_{10}; and SO_2, as well as volatile organic compounds (VOCs, which are precursors to ozone formation) and ammonia (NH_3, a precursor to PM formation).

G.2.2 Base Case Year

In determining the base case year for the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory, 2011 was initially selected based on data availability. Calendar year 2011 emissions data are readily available for most sources from the USEPA National Emissions Inventory (NEI) (USEPA, 2015a), and BOEM's *Year 2011 Gulfwide Emissions Inventory Study* (Wilson et al., 2014), hereby called the "2011 Gulfwide Inventory." However, 2011 was an unusually hot and dry year in the Gulf of Mexico OCS Region, particularly in Texas, which experienced record heat and dry conditions during the summer of 2011 and had a very high incidence of wildfires. Therefore, 2012 was selected as the base case year as more representative of "typical" conditions in the Gulf of Mexico OCS Region.

G.2.3 Geographical Domain

The domain of the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory is the area depicted in **Figure G-4**, particularly the 4-kilometer (km) domain encompassing the Gulf of Mexico OCS. This area, which includes parts of Alabama, Georgia, Louisiana, Mississippi, and Texas; all of Florida; as well as the Western, Central, and Eastern Planning Areas in the Gulf of Mexico and part of the Atlantic Ocean, are the main focus of the emissions inventory efforts. Emissions data were also required for the 36- and 12-km expanded domains depicted in **Figure G-4**, which include parts of Mexico and Canada. The outermost domain with 36-km resolution includes the entire continental U.S. and parts of Canada and Mexico, and captures synoptic-scale (storm system-scale) structures in the atmosphere. The inner 12-km regional grid covers the southeastern U.S. and is used to ensure that large-scale meteorological patterns across the region are adequately represented and to provide boundary conditions to the 4-km domain.

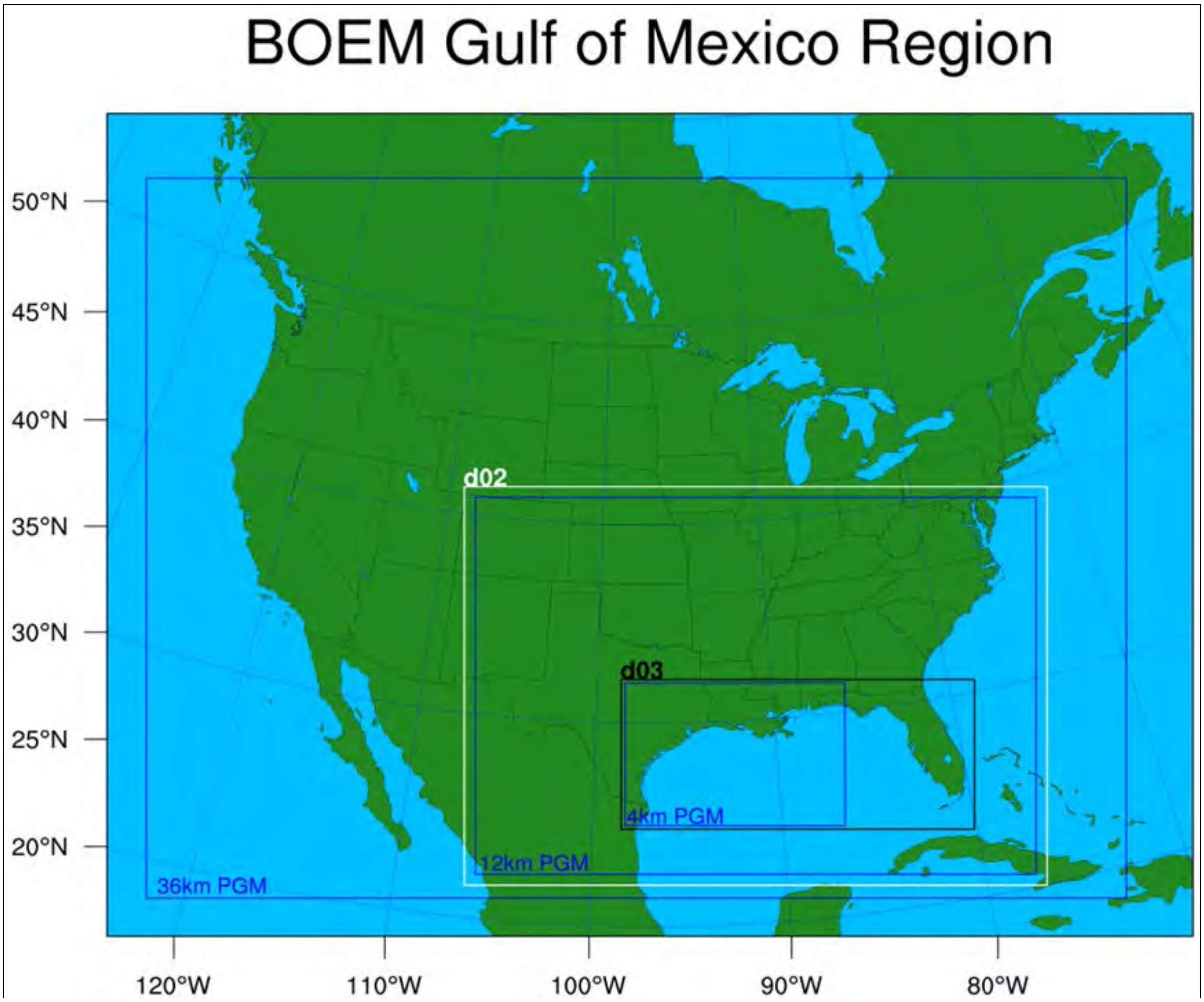

Figure G-4. WRF 36-km CONUS (d01), 12-km SE Regional (d02), and 4-km Gulf of Mexico Region (d03) Domains Along With the PGM Grids.

G.2.4 Inventory Sources

Emissions from anthropogenic (i.e., human caused) sources, including stationary point and nonpoint area sources located both onshore and offshore, onroad motor vehicles, nonroad equipment, locomotives, marine vessels and other offshore sources, and airports, were compiled for the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory. **Table G-2** lists the source groups and categories included in the emissions inventory, along with the pollutants applicable to each source, and the spatial and temporal resolution. Note that emissions from non-anthropogenic sources (i.e., biogenic and geogenic sources) are also included as part of the "Air Quality Modeling in the Gulf of Mexico Region" study cumulative and visibility analyses.

Table G-2. Gulf of Mexico Air Quality Modeling Study Source Categories.

Group and Source Category		CO	NO_x	SO_2	VOC	Pb	$PM_{2.5}$	PM_{10}	NH_3	Spatial Resolution[a]
NEI Onshore Sources	Point Sources	✓	✓	✓	✓	✓	✓	✓	✓	P
	Nonpoint Area Sources	✓	✓	✓	✓	✓	✓	✓	✓	A
	Onroad Mobile Sources	✓	✓	✓	✓		✓	✓	✓	A
	Commercial Marine Vessels	✓	✓	✓	✓	✓	✓	✓	✓	P, A[b]
	Locomotives	✓	✓	✓	✓	✓	✓	✓	✓	P, A[c]
	Aircraft and Airports	✓	✓	✓	✓	✓	✓	✓	✓	P
	Other Nonroad Mobile Sources	✓	✓	✓	✓		✓	✓	✓	A
Offshore Oil & Gas Sources	Platforms in State Waters	✓	✓	✓	✓		✓	✓		P
	Platforms in Central and Western GOM OCS Planning Areas	✓	✓	✓	✓	✓	✓	✓	✓	P
	Drilling Rigs	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Pipe-Laying Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Support Helicopters	✓	✓	✓	✓		✓	✓		LB
	Support Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Survey Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
Non-oil and Gas Offshore Vessels and Activities	Commercial Fishing Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Commercial Marine Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Louisiana Offshore Oil Port	✓	✓	✓	✓	✓	✓	✓	✓	P
	Military Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Recreational Vessels	✓	✓	✓	✓		✓	✓	✓	LB
	Vessel Lightering	✓	✓	✓	✓	✓	✓	✓	✓	P
Biogenic and Geogenic Sources	Subsurface Oil Seeps				✓					LB
	Mud Volcanoes				✓					LB
	Onshore Vegetation		✓		✓					A
	Wildfires and Prescribed Burning	✓	✓	✓	✓		✓	✓	✓	P
	Windblown Dust						✓	✓		A
	Lightning		✓							A
	Sea Salt Emissions						✓	✓		A
Sources in Mexico and Canada	Point Sources	✓	✓	✓	✓	✓	✓	✓		P
	Nonpoint Area Sources	✓	✓	✓	✓		✓	✓		A
	Mobile Sources	✓	✓	✓	✓		✓	✓		A

[a] A = Area source (modeling grid cell, spatial surrogate); P = Point source (UTM coordinates, stack parameters); LB = Offshore lease block (modeling grid cell, spatial surrogate)

[b] Larger ports and shipping will be represented as shape files; smaller ports as point sources.

[c] Rail yards will be represented as point sources; railway segments as area sources.

G.2.5 Spatial Resolution

The spatial resolution of the emissions inventory is source-specific. For example, sources such as power plants are identified based on their geographic coordinates (i.e., latitude and longitude), while other sources such as nonroad mobile sources (e.g., construction equipment) are spatially distributed using surrogates within the county in which they are reported and that are typically related to the activity distribution of the category (e.g., construction sites).

The resolution of the geographical area covered by the emissions inventory is based on the grid cell size needed for photochemical modeling. Furthermore, the photochemical model grid resolution is dependent on the grid resolution of the WRF meteorological model output used.

G.2.6 Temporal Resolution

Emissions for all sources were estimated on an annual basis (i.e., emissions generated during 2012). For electric generating units (EGUs), emissions were allocated on a sub-annual basis to reflect variations in activity using data from the USEPA.

Emissions were allocated on an hourly, daily, and seasonal basis using default temporal allocation factors provided with the Sparse Matrix Operator Kernel Emissions (SMOKE) emissions model for some sources; other temporal allocations were source-specific, and profiles were developed and applied within the SMOKE model.

G.2.7 Speciation

When applying the PGM modeling, PM emissions were allocated to individual PM species as part of the SMOKE emissions processing using PM speciation factors obtained from the USEPA's SPECIATE database (USEPA, 2014a) for each source category (as defined by the Source Classification Code). This resulted in the PM mass being broken into the mass associated with elemental carbon (EC), organic carbon (OC), and other elements, and particle-bound VOCs, such as polycyclic aromatic hydrocarbons (PAHs). The model predictions of EC will undergo further analysis and will be discussed in the "Air Quality Modeling in the Gulf of Mexico Region" study final report.

SMOKE was also used to convert VOC emissions into the photochemical mechanism-specific (e.g., CB05 or CB6r2h) model species used in air quality models.

G.3 Base Case Emission Estimates

This section presents an overview of the methodologies used to compile the base case 2012 emission estimates for all source categories in the emissions inventory.

G.3.1 Point Sources

Calendar year 2011 emissions data are available for onshore point sources from the USEPA NEI (USEPA, 2015a). In a separate modeling effort, the USEPA prepared a criteria pollutant calendar 2012 year emissions inventory for some sectors, including onshore point sources (USEPA, 2015b). The ERG obtained the USEPA 2012 point sources emissions inventory, conducted quality assurance/quality control (QA/QC) on the data, and supplemented and revised the criteria pollutant estimates, as needed. The USEPA prepared the 2012 point source emissions inventory as follows:

1. 2012 data compiled by the USEPA from annual criteria pollutant reporting of Type A (large) sources that are submitted by responsible State and local air agencies;
2. 2012 EGU emissions from the USEPA Clean Air Markets Division (CAMD) hourly emissions data;
3. 2011 NEI data for other, smaller point sources that are not identified above; and
4. 2011 airport and aircraft emission estimates developed by the USEPA updated to 2012 as needed.

Although the emissions data are likely complete for most point sources, ERG confirmed that offshore platforms within State boundaries are included in the NEI. Data from the USEPA's 2012 Toxics Release Inventory (TRI) for lead and ammonia were also used to supplement the inventory as needed (USEPA, 2015c).

G.3.2 Nonpoint Area Sources

The starting point for the 2012 nonpoint area source inventory was the data submitted by State and local agencies for the 2011 NEI. In addition, for completeness, the USEPA develops emission estimates for a number of nonpoint source categories (up to 165) for inclusion in the NEI if agencies do not provide estimates. The USEPA did not develop 2012 emission estimates for nonpoint area sources. The ERG prioritized key top-emitting source categories of NO_x, PM, SO_2, and VOCs in AL, FL, GA, LA, MS, and TX, and developed 2012 emission estimates using the USEPA nonpoint area source category tools (USEPA, 2014b). These categories are as follows: consumer products, architectural surface coatings, industrial maintenance coatings, open burning: municipal solid waste (MSW), residential and institutional/commercial/industrial (ICI) heating, upstream oil and gas, open burning, land clearing debris, paved and unpaved roads, and gasoline distribution Stage I. The ERG also conducted point source reconciliation for ICI heating, oil and gas, and gasoline distribution Stage I to verify that there are no gasoline distribution Stage II records in USEPA's nonpoint file (now reported with onroad mobile sources).

G.3.3 Mobile Sources

The onroad mobile source category includes exhaust and evaporative emissions from onroad motor vehicles (e.g., automobiles, light-duty trucks, heavy-duty trucks) and exhaust and evaporative emissions from nonroad mobile sources. The ERG team ran the MOVES2014 model for onroad sources (USEPA, 2014c), and the USEPA ran the NONROAD model for nonroad sources to develop 2012 emission estimates for these categories. Locomotive emissions in the 2011 NEI were not adjusted to represent 2012 activities because it was confirmed that the 2011 and 2012 fuel usage data from the Surface Transportation Board's R-1 Class 1 railroad annual reporting data (Surface Transportation Board, 2015) show only a slight (2%) reduction in 2012 levels from 2011 levels.

G.3.4 Offshore Helicopters

The Gulf of Mexico has more helicopter traffic than any other region of the U.S., primarily associated with offshore oil and gas support. Offshore support helicopter emission estimates were obtained from the 2011 Gulfwide inventory (Wilson et al., 2014). The estimates were supplemented with 2011 NEI helicopter data for onshore airports. The two datasets map out the full route between offshore platforms equipped with helipads and the closest onshore support facility; the NEI addresses emissions only at each airport and only for operations up to 3,000 feet of elevation (i.e., local mixing height). The two datasets were evaluated to ensure that the helicopter traffic data between the two are comparable and that there is no double counting of emissions.

G.3.5 Offshore Oil and Gas Production Sources—Western and Central/Eastern Planning Areas in the Gulf of Mexico

The starting point for offshore oil and gas production platforms in the Western and Central/Eastern Planning Areas (WPA and CPA//EPA) was the 2011 Gulfwide inventory. The ERG team supplemented the 2011 Gulfwide inventory with NH_3 and Pb emission estimates for all applicable emission sources using USEPA emission factors. The ERG team conducted research to determine if the 2011 emissions values for platform sources should be adjusted to be more representative of 2012 emissions values. Offshore oil and gas production values for 2011 and 2012 were obtained from the BOEM Part A Oil and Gas Operations Reports (OGOR) (USDOI, BOEM, 2015). The OGOR data are presented at the lease level. Production of both oil and gas (including deepwater production) decreased from 2011 to 2012; thus, the 2011 emission estimates were modeled without adjustment in order to be conservative. **Table G-3** presents the base case emission estimates for offshore oil and gas production sources in the WPA and CPA//EPA. **Figures G-5 through G-7** show the NO_x, VOC, and $PM_{2.5}$ emissions from platform sources. Platform sources include the following emission source types: amine units, boilers/heater/burners, diesel and gasoline engines, drilling equipment, combustion flares, fugitives, glycol dehydrators, losses from flashing, mud degassing, natural gas engines, natural gas turbines, pneumatic pumps, pressure/level controllers, storage tanks, and cold vents.

Table G-3. Base Case Offshore Oil and Gas Production Source Emissions Estimates for the GOM Western and Central/Eastern Planning Areas.

	NO_X (TPY)	SO_2 (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)	VOC (TPY)	CO (TPY)	Pb (TPY)	NH_3 (TPY)
Platform Sources	84,128	3,197	838	835	54,724	70,339	<1	40
Non-platform Sources	232,765	22,977	8,632	8,225	7,937	41,880	701	70,139
Total	**316,893**	**26,174**	**9,470**	**9,060**	**62,661**	**112,219**	**701**	**70,179**

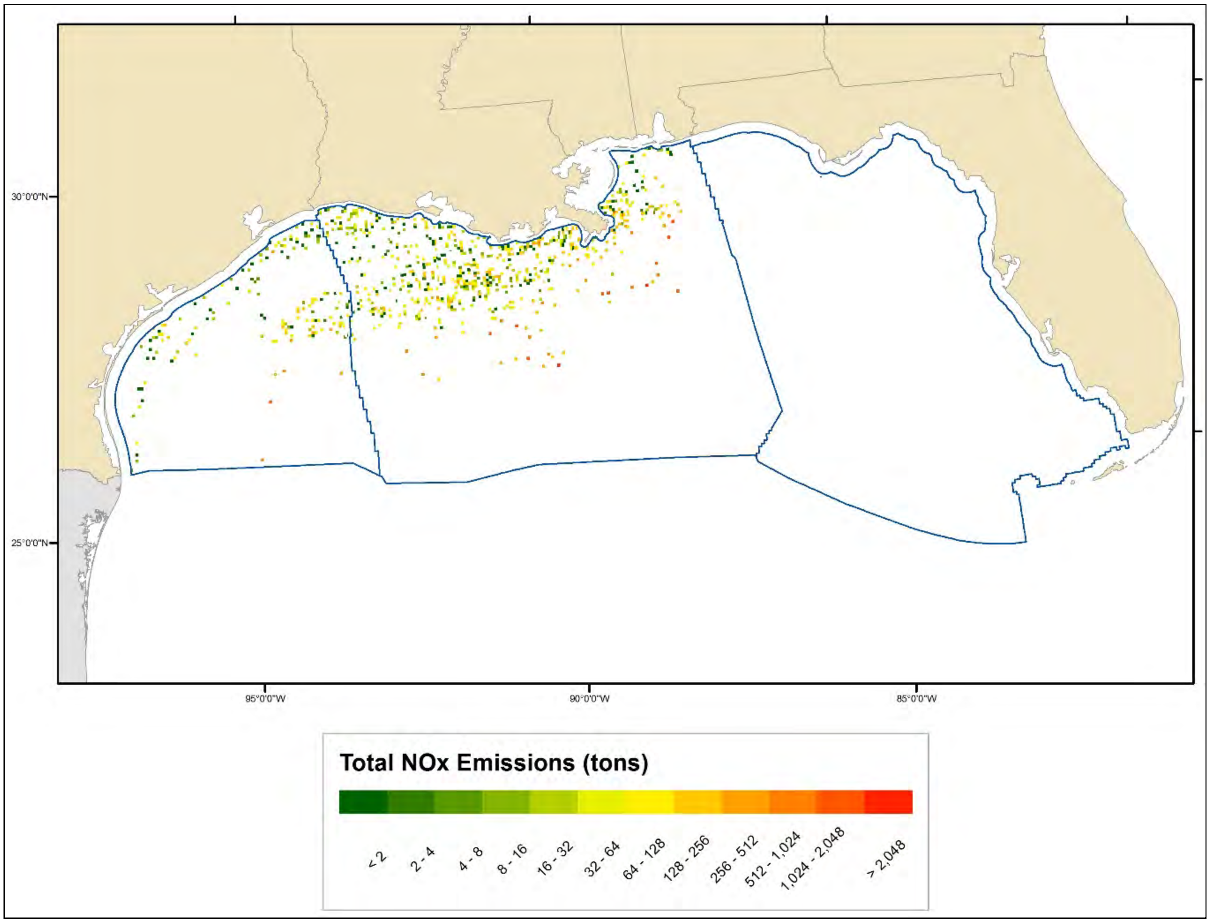

Figure G-5. *2012 Platform NO_x Emissions Aggregated by Lease Block. (Note: This figure does not indicate the platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)*

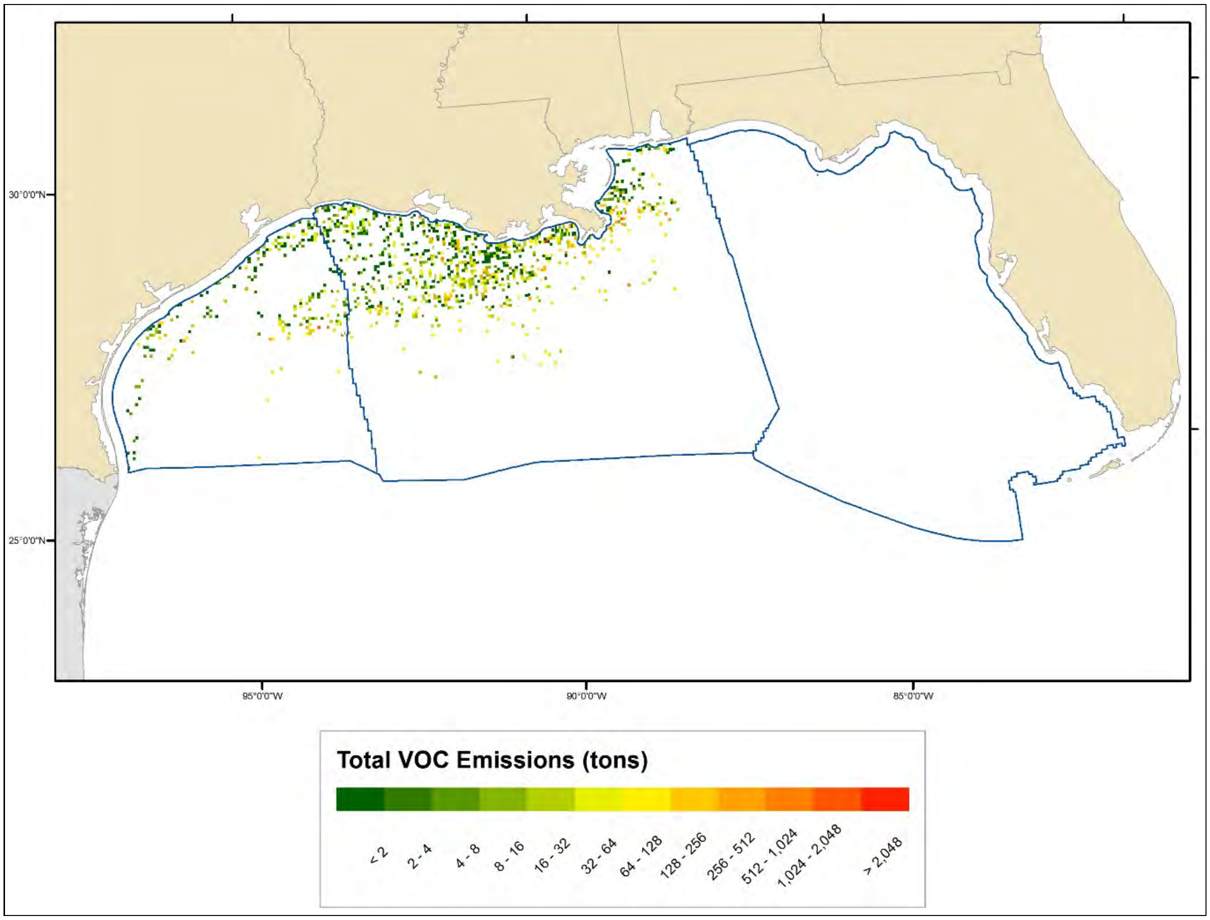

Figure G-6. 2012 Platform VOC Emissions Aggregated by Lease Block. (Note: This figure does not indicate the platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)

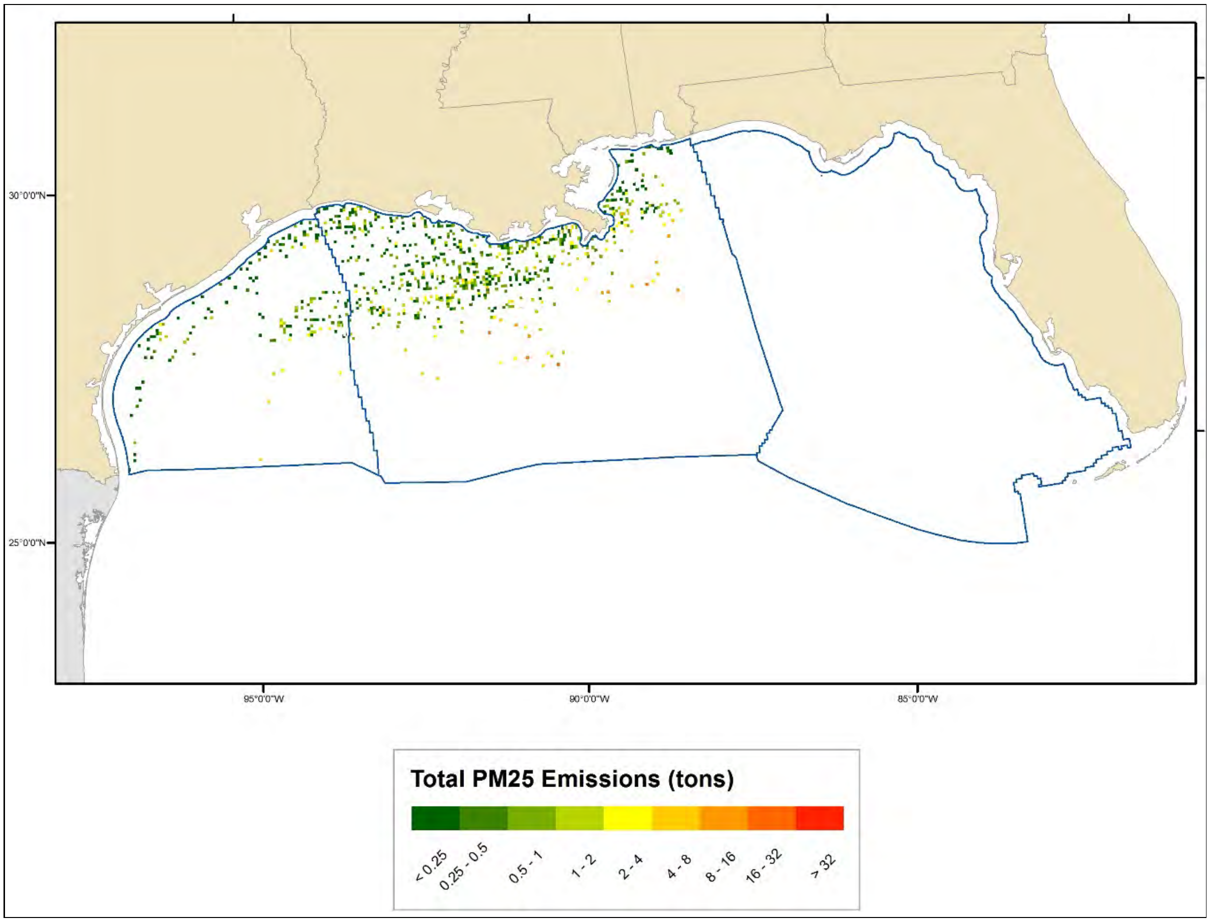

Figure G-7. 2012 Platform $PM_{2.5}$ Emissions Aggregated by Lease Block. (Note: This figure does not indicate the platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)

G.3.6 Offshore Vessels

Offshore vessels can be grouped into vessels that support the construction, operation, and decommissioning of oil and gas platforms; and vessels involved in other commercial, recreational, and military operations. All marine vessels included in this study operate using diesel engines. These include very large propulsion engines as well as smaller auxiliary diesel engines that provide power for electricity generation, winches, pumps, and other onboard equipment. Smaller engines tend to use distillate grade diesel fuel, while large engines are able to combust heavier residual blends.

40 CFR § 1043.109(b) created the North American Emission Control Area (ECA), which includes the Gulf of Mexico (USEPA, 2010). This regulation limits marine fuel sulfur content to 1% after August 1, 2012, for any vessel with a gross tonnage greater than 400. Vessels below this threshold tend to use distillate fuels, which are already at or below the 1% limit.

G.3.6.1 Oil and Gas Production Support Vessels

The offshore oil and gas production sector requires a wide variety of vessels to support the exploration, development, and extraction of oil and gas, including the following:

- seismic survey vessels;
- drilling vessels;
- pipe-laying vessels;
- crewboats; and
- supply vessels.

For the 2011 Gulfwide inventory, Automatic Identification System (AIS) data from PortVision were used to map spatial aspects of vessel movements (PortVision, 2012). The AIS is an automated tracking system that allows exchanges of location and contact data with other nearby ships, offshore platforms, satellites, and AIS base stations, enhancing navigation and reducing at-sea collisions.

On October 22, 2003, the U.S. harmonized the AIS mandates of the Safety of Life at Sea Convention with the Maritime Transportation Security Act of 2002 (MTSA), which requires the following vessels, including offshore support vessels, to participate in the AIS program:

(1) passenger vessels of 150 gross tonnage or more;

(2) tankers, regardless of tonnage; and

(3) vessels other than passenger vessels or tankers of 300 gross tonnage or more.

Vessels that do not meet these thresholds, such as crew boats and smaller support vessels, can still participate in AIS on a voluntary basis. The Offshore Marine Service Association (OMSA) is encouraging its membership to equip their vessels with AIS transponders, allowing for more efficient and safer ship movements in the highly congested central and western areas of the Gulf of Mexico.

The ERG team used the spatially distributed support vessel emission estimates from BOEM's 2011 Gulfwide inventory. While the USEPA 2011 NEI also includes marine vessel emission estimates for the Gulf of Mexico, the emission estimates were derived from national vessel activity data. During QA/QC of the 2011 BOEM Gulfwide estimates, ERG found and corrected an error in the vessel power rating for a number of smaller vessels.

As discussed above for offshore oil and gas production platforms, the 2011 emission estimates for these vessels were not adjusted to reflect 2012 production levels. SO_x and PM (associated with sulfates) were not adjusted to account for the introduction of low sulfur ECA compliant fuel in the last 5 months of 2012 because it was determined that most support vessels are

Category 1 or 2, which already use ECA compliant fuels. Emission estimates for NH_3 and Pb were also developed for vessels. **Table G-3** presents the base case emission estimates for drilling rigs, pipe-laying operations, support helicopters, support vessels, and survey vessels. **Figures G-8 through G-10** show the NO_x, VOC, and $PM_{2.5}$ emissions from non-platform sources.

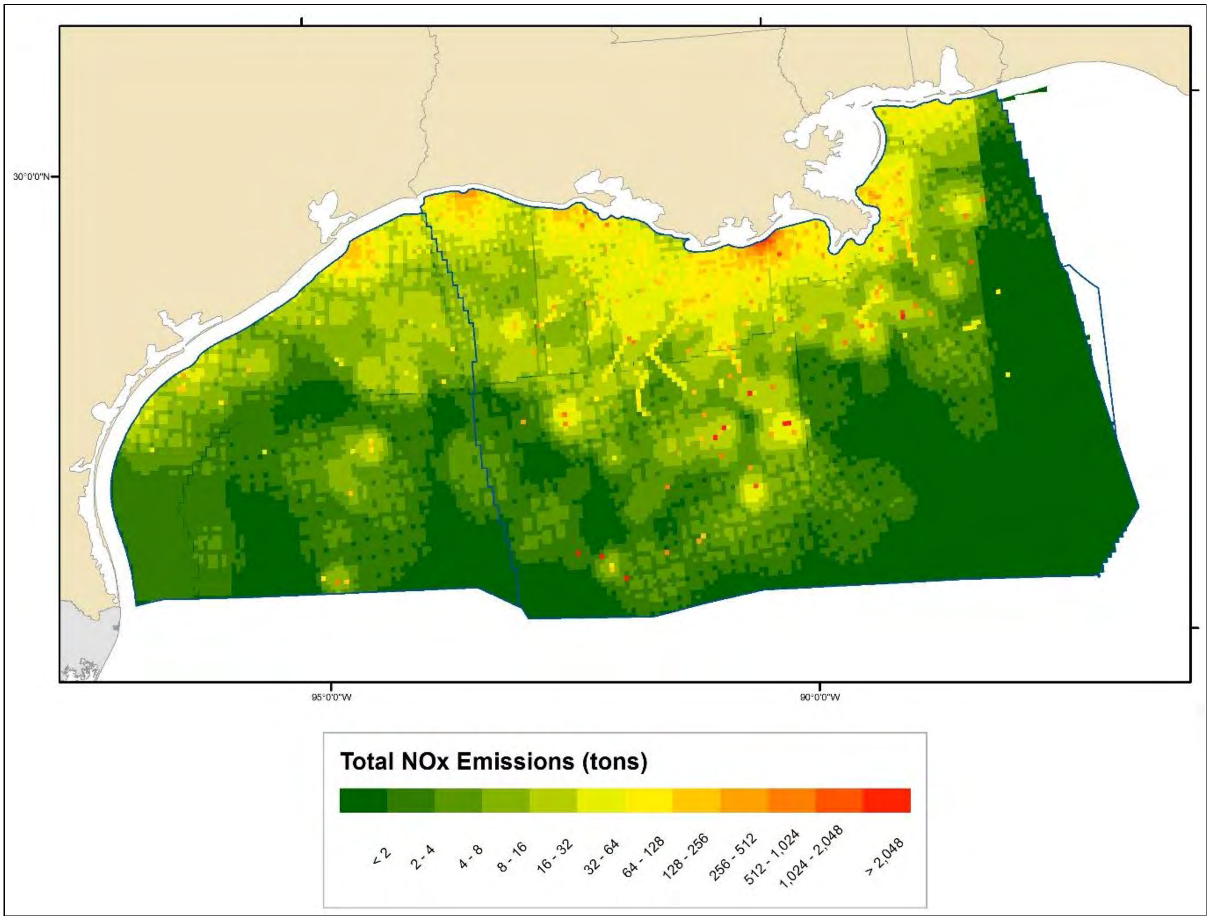

Figure G-8. 2012 Non-platform NO_x Emissions. (Note: This figure does not indicate the non-platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)

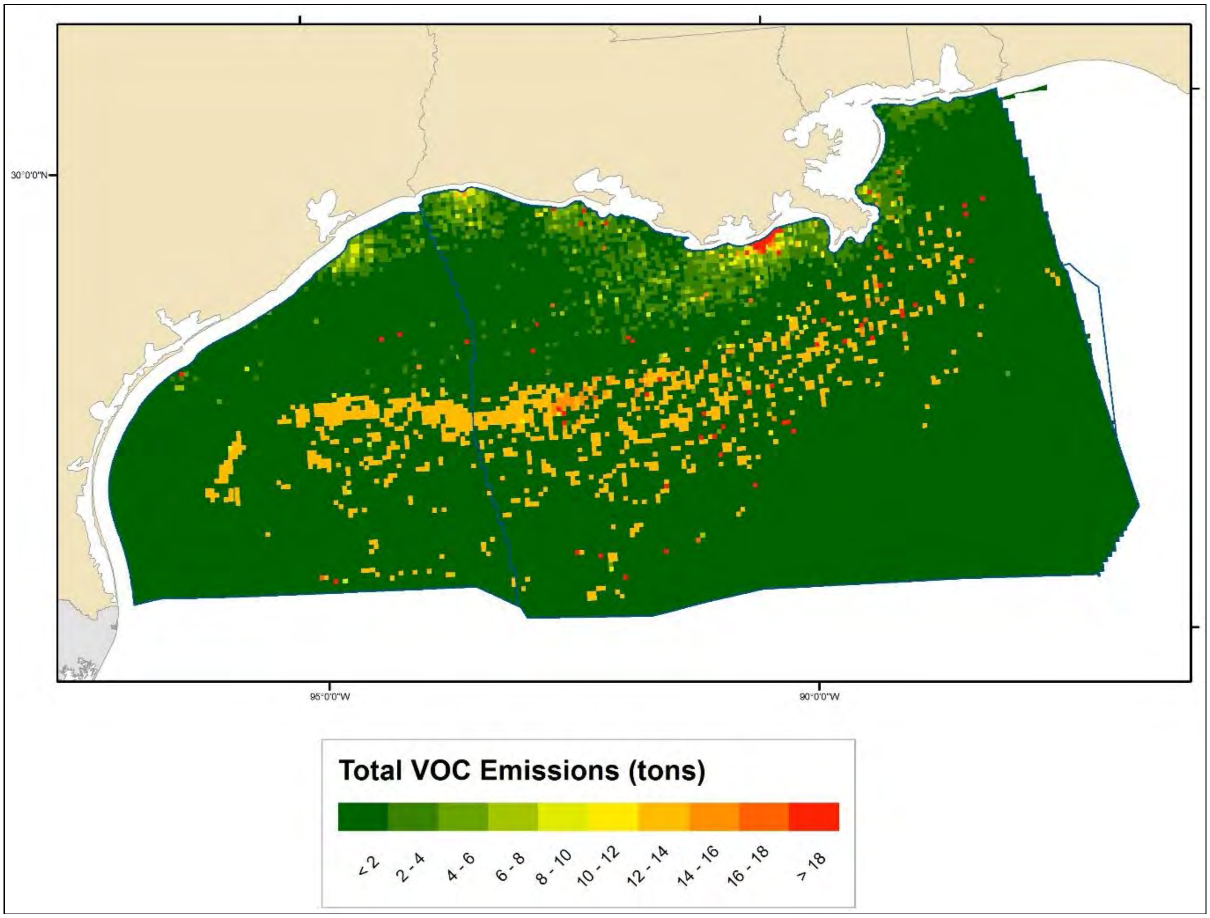

Figure G-9. 2012 Non-platform VOC Emissions. (Note: This figure does not indicate the non-platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)

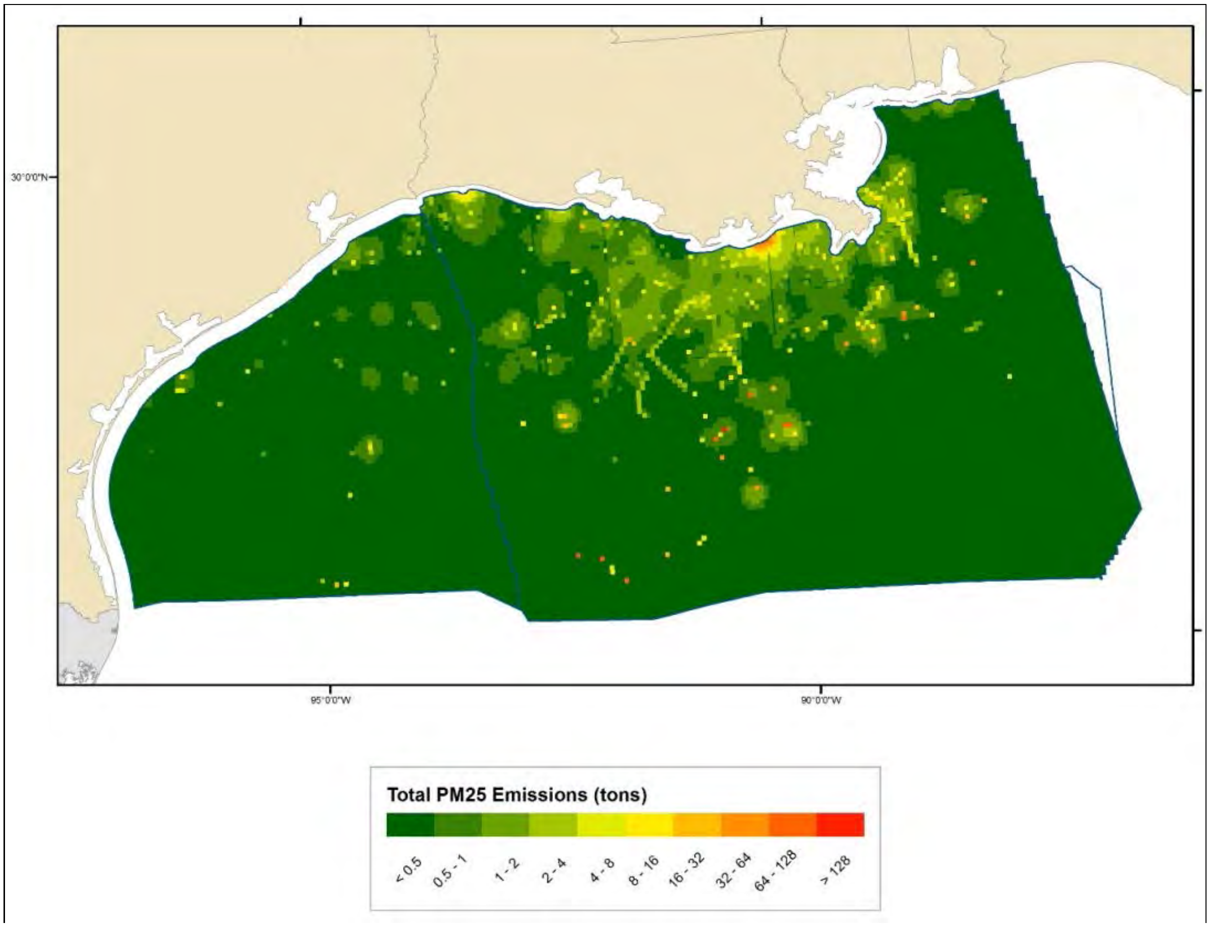

Figure G-10. 2012 Non-platform $PM_{2.5}$ Emissions. (Note: This figure does not indicate the non-platform source count, location, or emissions at the time of publication of the 2017-2022 GOM Multisale EIS.)

The ERG team obtained drilling vessel data from BSEE to confirm that there was no drilling activity in the eastern Gulf of Mexico OCS Region in 2012, and reviewed the permits granted by the USEPA for offshore platforms in the eastern Gulf of Mexico OCS Region to confirm there were no active production platform activities in 2012.

G.3.6.2 Non-oil and Gas Production Offshore Vessels

Vessels not directly associated with the offshore oil and gas activities include the following:

- commercial marine vessels;
- Louisiana Offshore Oil Port-associated vessels;
- commercial and recreational fishing vessels;
- ferries;
- research vessels;

- harbor craft; and
- military vessels.

Commercial marine vessels (CMVs) include large ships involved in international trade that visit coastal ports and operate in deep waters, as well as smaller general cargo ships and tugs that move barges along waterways and rivers. For the Federal waters of the central and western of the Gulf of Mexico, the ERG team used the commercial marine vessel data from the 2011 Gulfwide inventory. For completeness, for all other areas of the Gulf of Mexico, Atlantic Ocean, and State waters, the USEPA's NEI data were used (which were developed from national vessel activity data as noted above). These inventories cover different geographical areas than the BOEM inventory, as well as different vessel types. BOEM's data include large deepwater vessels as does the USEPA data beyond the Federal/State boundary, but they also include vessels such as ferries, dredging vessels, tugs, towboats, and harbor craft that tend to operate only in State waters.

The Louisiana Offshore Oil Port (LOOP) is a pumping platform for tankers to discharge imported crude oil to the mainland without having to maneuver through port traffic. Similarly, there are four offshore lightering zones in the Gulf of Mexico (i.e., Southtex, Gulfmex No. 2, Offshore Pascagoula No. 2, and South Sabine Point) where smaller shuttle tankers can move product from very large crude carriers, bringing the oil to port while the large tankers remain off the coast. Tankers that visit the LOOP or the lightering zones along with the shuttle tankers were identified in the 2011 Gulfwide inventory. The inventory also accounts for evaporative emissions from unloading and loading activities, and emissions from the operation of generators and pumps at the LOOP; adjustments were made to the 2011 LOOP emission estimates to reflect the 18% decline in crude imports in 2012.

Emissions from the operation of commercial and recreational fishing vessels are also included in the 2011 Gulfwide inventory for Federal waters. These were supplemented with the USEPA's 2011 NEI data for these fishing vessels for operations in the Eastern Planning Area in the Gulf of Mexico, Atlantic Ocean, and State waters. For military vessels, the ERG team used the 2011 Gulfwide inventory Navy and Coast Guard vessel emission estimates and the NEI's Coast Guard emission estimates for State waters, as well as Federal waters in the eastern part of the Gulf of Mexico and the Atlantic Coast. The ERG team conducted research to determine that activity levels from 2011 to 2012 were similar for the other non-oil and gas vessels (e.g., tankers, container ships, bulk, and general cargo). Based on the most recent International Maritime Organization data (IMO, 2015), fuel combustion is projected to remain constant from 2010 to 2015. Thus, no adjustments were needed to approximate activities in 2012.

The SO_2 and PM (associated with sulfates) emission estimates were adjusted for Category 3 vessels to account for the introduction of low sulfur ECA-compliant fuel in the last 5 months of 2012.

G.3.7 Biogenic and Geogenic Sources

For completeness, it is important to include non-anthropogenic emission sources in the inventory. The ERG team also estimated emissions for the sources listed below.

- Onshore vegetation (biogenic): MEGAN (version 2.1) biogenic emission model
- Wildfires, prescribed burns, and agricultural burning: USEPA's SMARTFIRE emissions inventory for the U.S.
- Windblown dust: Windblown dust (WBD) modeling using the WRF meteorological dataset
- Lightning: WRF data (preprocessor)
- Subsurface oil seeps: 2011 Gulfwide inventory
- Mud volcanoes: 2011 Gulfwide inventory
- Sea salt emissions: WRF data (preprocessor)

The ERG team used fire emission estimates from the National Center for Atmospheric Research (NCAR) Fire INventory (FINN) for Mexico and Canada.

G.3.8 Sources In Mexico

The ERG team developed the 2012 emission inventories for the portions of Mexico within the 36-km modeling inventory domain using the municipality-level emission files from the 2008 Mexico National Emissions Inventory (MNEI) (SEMARNAT, 2014) combined with projection factors for point, nonpoint area, and nonroad mobile sources. Mexico onroad motor vehicle emissions were generated using a version of the USEPA vehicle emissions model MOVES, updated to reflect conditions in Mexico. MOVES2014 was the most recent version of the model available at the time of the analysis and reflects USEPA's latest estimate of vehicle emissions and default U.S. activity data (USEPA, 2014c). The ERG also conducted research on the offshore oil production activities off the coast of Mexico. Based on a report published by the Congressional Research Service, it was determined that there was no offshore production within the 36-km modeling domain in 2012 (Seelke et al., 2015).

G.3.9 Sources In Canada

Emissions from the USEPA's most recent modeling platform (2010) were used for sources in Canada.

G.4 FUTURE YEAR MODELING SCENARIO EMISSION ESTIMATES

Emission estimates were also needed as inputs for additional modeling scenarios that will predict future impacts from implementation of the 2017-2022 GOM Multisale EIS. For modeling the future year impacts, the ERG team forecast emissions estimates based on information provided by

BOEM, combined with USEPA projected emission estimates and other data for onshore sources and marine vessels and other sources outside of the GOM region. The ERG team confirmed that offshore drilling in the EPA under USEPA air quality jurisdiction is included in BOEM's 2017-2022 *Outer Continental Shelf Oil and Gas Leasing: Proposed Final Program* (Five-Year Program) spreadsheets. The ERG also reviewed the USEPA's offshore oil and gas production permits to confirm that no production platforms were permitted to be constructed prior to or during 2017. Projected emission estimates were developed for anticipated offshore drilling off the coast of Mexico.

G.4.1 Western, Central, and Eastern Planning Areas OCS Offshore Oil and Gas Production Sources

The ERG team developed annual emission estimates for all categories and pollutants for each year of activity for OCS offshore oil and gas production sources associated with the Five-Year Program using BOEM's spreadsheet-based data analyses tools. BOEM provided information on the predicted levels of activity, sources, and locations (by planning area and water depth) to depict offshore oil and gas activities in the future scenario. The emissions estimates are based on a mid-price oil case scenario and cover the WPA, CPA, and EPA, which are under BOEM's jurisdiction.

After completion of the OCS offshore oil and gas production source emission estimates, the resulting cumulative emissions for each pollutant were assessed to determine which emission estimates should be selected for PGM modeling to support the cumulative and visibility impacts analyses.

Based on information provided by BOEM, it was assumed that emissions for the following sources occur during the total period of proposed activity based on the 2017-2022 GOM Multisale EIS scenario (2017-2056)[1]:

- exploration and delineation well drilling activities (1,671 wells drilled);
- development and production well drilling activities (1,135 wells drilled);
- platform installation activities (535 platforms installed);
- FPSO installation (1 FPSO installed);
- FPSO operation (1 FPSO operating);
- FPSO removal (1 FPSO removed);
- pipeline installation excluding State waters (7,251 km of pipeline installed);
- platform oil and gas production (535 platforms in operation);

[1] Excluding the Gulf of Mexico Energy Security Act (GOMESA) moratorium area.

- platform removal (535 platforms removed);
- support helicopters (642,000 round trips); and
- support vessels (1,062,000 operations).

The BOEM data analyses tools provide information on each of these anticipated activities by year, as well as water depth. The anticipated water depths by planning area were used to spatially allocate the emissions.

The ERG used this information to develop emission estimates for each source category based on emission estimation methods used in past Gulfwide emissions inventory studies and other data compiled for BOEM in order to determine which estimates should be selected for photochemical modeling to support the cumulative and visibility impacts analyses.

The following sections discuss the emission estimation methods that the ERG team used to estimate emissions for the BOEM oil and gas production sources in the future scenario.

G.4.1.1 Oil and Natural Gas Offshore Production Platforms

In order to develop reasonably foreseeable emission estimates for projected oil and natural gas production platforms, the emission factors presented in **Table G-4** were developed based on the 2011 Gulfwide inventory (Wilson et al., 2014). Because deepwater operations may significantly differ from conventional operations in shallower waters, are technologically more sophisticated, and produce at much higher rates, two sets of emission factors were developed and assigned to each projected platform based on water depth. Depths below 200 meters (656 feet) were assigned the shallow-water emission factors, and depths above were assigned deepwater emission factors.

Emission estimates for platform sources were developed based on platform installation and carried forward until the projected platform removal dates (provided by planning area and water depth).

Table G-4. Future Year Production Platform Emission Factors.

Pollutant	Shallow Water Emission Factors (<200 m) (tons/platform/yr)	Deepwater Emission Factors (>200 m) (tons/platform/yr)
CO	56	192
NO_x	46	582
PM_{10}-PRI	0.5	5.17
$PM_{2.5}$-PRI	0.50	5.15
SO_2	0.51	44
VOC	22	96
Pb	2.38E-05	3.79E-03
NH_3	0.0349	0.49

Source: Developed from the *Year 2011 Gulfwide Emissions Inventory* (Wilson et al., 2014).

G.4.1.2 Offshore Support Helicopters

The ERG team obtained helicopter emission factors from the Switzerland Federal Office of Civil Aviation (FOCA) Guidance on Determination of Helicopter Emissions (FOCA, 2009). However, the landing and takeoff (LTO) cycle used by FOCA was determined to be too short for typical trips taken in the Gulf of Mexico. The time-in-mode values were therefore adjusted based on the International Civil Aviation Organization (ICAO) test cycles, which are considered to be appropriate for offshore operations in the Gulf of Mexico. Because the future fleet mix is unknown, ERG weighted the emission factors using fleet profile data from the Helicopter Safety Advisory Conference (HSAC, 2015). The VOC emission factors were developed by converting the hydrocarbon (HC) emission factors using data from the USEPA's Procedures for Emission Inventory Preparation Volume IV: Mobile Sources (USEPA, 1992). The aggregated general aviation conversion factor of 1.0631 for turbine engines was used because the GOM support helicopter fleet is primarily equipped with turbine engines. The $PM_{2.5}$ emission factors were speciated from PM_{10} factors using USEPA aircraft speciation data, and the SO_2 emission factors were developed based on a typical jet fuel sulfur concentration of 0.05% (UNEP, 2012).

G.4.1.3 Oil and Gas Production Offshore Support Vessels

Four components are needed to estimate future offshore vessel emissions:

- vessel characteristics (engine power and speed);
- engine operating load (percent of maximum engine power);
- hours of operation (typically determined by the distance the vessel travels divided by the vessel speed); and
- appropriate emission factors (grams per kW-hr).

Because there is uncertainty about the location of future activities, it was assumed that a typical vessel trip is 200 nautical miles, which is the round-trip distance from shore to the mid-point of Federal waters.

In projecting future year activity, it is not always possible to identify specific vessels that will be used. Therefore, the use of larger vessels that represent the upper bound of each vessel type was assumed, such that actual future year emissions should be similar to or lower than emission estimates developed using this fleet profile. These vessels were identified based on data compiled from the Information Handling Service (IHS) Register of Ships (IHS, 2015). Vessels from the global fleet were used because these larger ships move internationally based on local demand. It should also be noted that these larger vessels tend to be involved in deepwater activities because they are designed for extended open-water operations. As trends to develop deeper water locations in the Gulf of Mexico continue into the future, it is likely that these larger or similar vessels will support future year activities.

The selected vessels and their characteristics are presented in **Table G-5**. In order to correctly match the vessel to the appropriate emission factors, the vessel engine category is required. The USEPA vessel category was determined by calculating the cylinder volume based on the stroke length and diameter of the cylinder. The USEPA categories are defined by the following cylinder volumes:

- Category 1: Cylinder displacement less than 5 liters;
- Category 2: Cylinder displacement from 5 to 30 liters; and
- Category 3: Cylinder displacement greater than 30 liters.

If a vessel's cylinder volume was unknown, it was assumed that the vessel was powered by a Category 3 propulsion engine. It should also be noted that all of the selected vessels are foreign flagged, but it is assumed that they refuel using U.S.-regulated marine fuels as they shift equipment and supplies from nearby U.S. ports.

Table G-5. Summary of Vessel Characteristics.

Vessel Type	Total Main Power (kW)	Vessel Name	Propulsion Engine Category	Speed (knots)
Drillship	48,666	*Rowan Renaissance*	3	12
Jackup	12,485	*Bob Palmer*	2	
(auxiliary)	Not self-propelled			
Platform Rig	8,100	*Nabors Mods 087*	2	
(auxiliary)	Not self-propelled			
Semisubmersible	22,371	*ENSCO 7500*	2	3.5
Submersible	3,691	*Hercules 78*	2	
(auxiliary)	Not self-propelled			
FPSO	14,110[1]	*Terra Nova FPSO*	2	12.0
FSO	51,519	*Africa*	3	16.5
Stimulation Vessel	15,840	*Norshore Atlantic*	2	14
Oil Tanker	13,369	*SPT Explorer*	3	15
Anchor Handling Vessel	27,000	*KL Sandefjord*	3	17
Crew Boat	11,520	*R. J. Coco Mccall*	3	23
Supply Vessel	18,000	*Aleksey Chirikov*	3	15
Tug Boat	19,990	*Yury Topchev*	3	15
Pipe-Laying Vessel	67,200	*Castorone*	3	14

[1] Only distillate oil main engine kW included (430 kW & 2 x 6840 kW). Topside emissions are included in the deepwater production platform estimates.

A vessel's engine power varies relative to the type of operation that is implemented. While cruising in open waters, the propulsion engine load is typically 84% of maximum load; during maneuvering, it can be 60% or lower; and when stationary,. it can be 10% or lower. **Table G-6** presents the aggregated load factors that will be used in this Study for propulsion and auxiliary engines.

Table G-6. Load Factors to be Used in the Future Year Projections.

Vessel Type	Load Factor
Propulsion Cruising	0.8-0.85
Propulsion Idle	0.1
Propulsion Crew/Supply Boat	0.45
Propulsion Drill Ship and Semi-Submersible	0.83
Propulsion Pipe-Laying Vessel	0.16
Propulsion Tug	0.68
Auxiliary Emergency Generator	0.75
Drilling Equipment	1

The future year emission factors were developed in terms of grams of pollutant emitted per load-adjusted engine kW-hours based on the emission factors used in the USEPA's 2014 NEI (**Table G-7**). The factors presented below are applicable for foreign-flagged vessels that are not required to comply with USEPA exhaust standards but that must comply with international Emission Control Area (ECA) standards. These future year factors account for the reduction in fuel sulfur level associated with the ECA. Because Category 2 foreign-flagged offshore support vessels will be refueling at U.S. ports, it was anticipated that these vessels will use low sulfur compliant U.S. fuels. Also, the NO_x emission factors were adjusted to account for the 2016 ECA Tier III standard that requires high efficiency, after-treatment technology, and is applicable for U.S. and foreign-flagged vessels. The Category 3 PM emission factors were not adjusted to account for reductions in PM as sulfate compounds because the USEPA's adjustment equation provided a PM factor lower than the PM emission factor for Category 2 powered vessels.

Table G-7. Marine Vessel Emission Factors (g/kW-hr).

Engine Category	NO_x	SO_2	PM_{10}	$PM_{2.5}$	VOC	CO	HC	NH_3	Pb
2	3.4	0.006	0.320	0.310	0.141	2.48	0.13	0.005	0.00003
3	3.4	0.362	0.450	0.437	0.632	1.40	0.60	0.003	0.00003

Source: USEPA, 2016b.

G.4.1.4 Future Year Emission Estimates and Selection of Future Modeling Year

The emission estimates developed for the future BOEM oil and gas production sources were reviewed to determine the most suitable future year emissions to model. The PGM modeling for the cumulative and visibility impacts analysis was conducted based on the emissions anticipated to have the greatest impact on the air quality of any state. This was determined based on the estimated annual emission trends. The future highest NO_x emission year for all activities in all planning areas coincided with the highest PM, CO, NH_3, and Pb emissions. These emissions are driven by support vessel activity for the most part. The future highest VOC emission year for all activities in all planning areas coincided with the highest SO_2 emissions and is driven by production platform emissions. **Table G-8** presents the resulting emission estimates, and **Figure G-11** presents a graphical depiction of the annual emission estimates for all pollutants. **Figures G-12 through G-14** present graphical depictions of the annual emission estimates for NO_x, VOC, and $PM_{2.5}$ by source category.

It was concluded that BOEM would model the activity data and resulting emission estimates for year 2033 for non-platform sources, and year 2036 activity data and resulting emission estimates for platform sources.

Table G-8. Emission Estimates for the Western, Central, and Eastern Planning Areas, All Depths, By Year and Pollutant.

Year	NO_x (TPY)	SO_2 (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)	VOC (TPY)	CO (TPY)	Pb (TPY)	NH_3 (TPY)
2017	3,693	40	360	349	200	2,591	0.03	10
2018	19,328	118	1,813	1,759	1,213	14,058	0.17	80
2019	34,958	158	3,199	3,104	2,150	25,462	0.30	98
2020	46,119	268	4,124	4,001	3,042	33,293	0.39	111
2021	50,126	379	4,368	4,238	3,807	35,937	0.42	125
2022	54,328	446	4,605	4,469	4,535	38,906	0.45	139
2023	57,639	527	4,888	4,743	5,311	41,426	0.48	154
2024	59,979	484	5,030	4,881	5,872	43,637	0.49	170
2025	64,527	523	5,413	5,252	6,543	47,198	0.53	189
2026	70,601	598	5,870	5,696	7,510	51,762	0.57	209
2027	76,146	704	6,305	6,118	8,419	55,747	0.61	228
2028	79,863	742	6,609	6,414	9,125	58,701	0.64	244
2029	85,277	803	7,012	6,805	10,034	62,750	0.68	262
2030	90,332	876	7,381	7,163	11,010	66,523	0.72	280
2031	97,123	984	7,860	7,628	12,185	71,365	0.77	298
2032	100,564	1,022	8,057	7,820	13,228	74,107	0.79	315
2033	**108,447**[1]	1,199	**8,590**	**8,338**	14,709	**79,486**	**0.85**	**334**
2034	101,673	1,193	7,919	7,687	14,939	74,742	0.79	329
2035	102,443	1,253	7,923	7,691	15,484	75,167	0.79	327
2036	103,354	**1,395**	7,865	7,635	**15,940**	75,096	0.79	318
2037	96,715	1,343	7,274	7,062	15,254	70,088	0.74	298
2038	92,539	1,327	6,935	6,732	14,560	66,732	0.71	283
2039	84,787	1,280	6,269	6,087	13,443	60,725	0.65	247
2040	79,475	1,235	5,841	5,672	12,317	56,455	0.61	226
2041	77,705	1,294	5,652	5,488	11,544	54,267	0.60	209
2042	71,710	1,292	5,110	4,962	10,485	49,266	0.55	187

Table G-8. Emission Estimates for the Western, Central, and Eastern Planning Areas, Emissions Estimations for Western, Central, and Eastern Planning Areas, All Depths, By Year and Pollutant (continued).

Year	NO_x (TPY)	SO_2 (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)	VOC (TPY)	CO (TPY)	Pb (TPY)	NH_3 (TPY)
2043	51,254	1,094	3,390	3,293	8,643	34,736	0.38	157
2044	46,692	1,077	3,018	2,932	7,842	31,076	0.35	143
2045	42,933	1,009	2,752	2,673	7,115	28,358	0.32	128
2046	39,227	974	2,433	2,364	6,492	25,503	0.29	117
2047	37,540	965	2,313	2,247	6,006	24,050	0.28	108
2048	34,738	954	2,083	2,024	5,495	21,808	0.26	98
2049	32,995	904	1,995	1,939	5,020	20,615	0.25	90
2050	28,873	849	1,688	1,640	4,403	17,665	0.22	82
2051	26,286	796	1,524	1,481	3,872	15,834	0.20	73
2052	24,303	747	1,406	1,367	3,475	14,510	0.18	67
2053	15,585	598	757	737	2,610	8,716	0.11	23
2054	13,131	592	542	527	2,333	6,838	0.09	17
2055	12,062	502	548	533	2,010	6,479	0.09	16
2056	10,119	453	434	422	1,615	5,185	0.07	12
2057	9,083	450	340	331	1,528	4,407	0.06	9
2058	8,519	405	344	335	1,321	4,185	0.06	8
2059	7,182	316	321	313	1,031	3,653	0.05	7
2060	6,052	314	215	209	984	2,829	0.04	5
2061	5,765	270	237	231	877	2,852	0.04	5
2062	5,075	268	180	176	760	2,305	0.04	4
2063	4,614	224	186	181	646	2,201	0.03	3
2064	3,524	136	183	178	433	1,872	0.03	2
2065	1,906	46	130	126	175	1,157	0.02	1
2066	1,392	46	81	79	153	782	0.01	1

[1] Bold numbers are the highest emissions per year per pollutant. These were the amounts modeled.

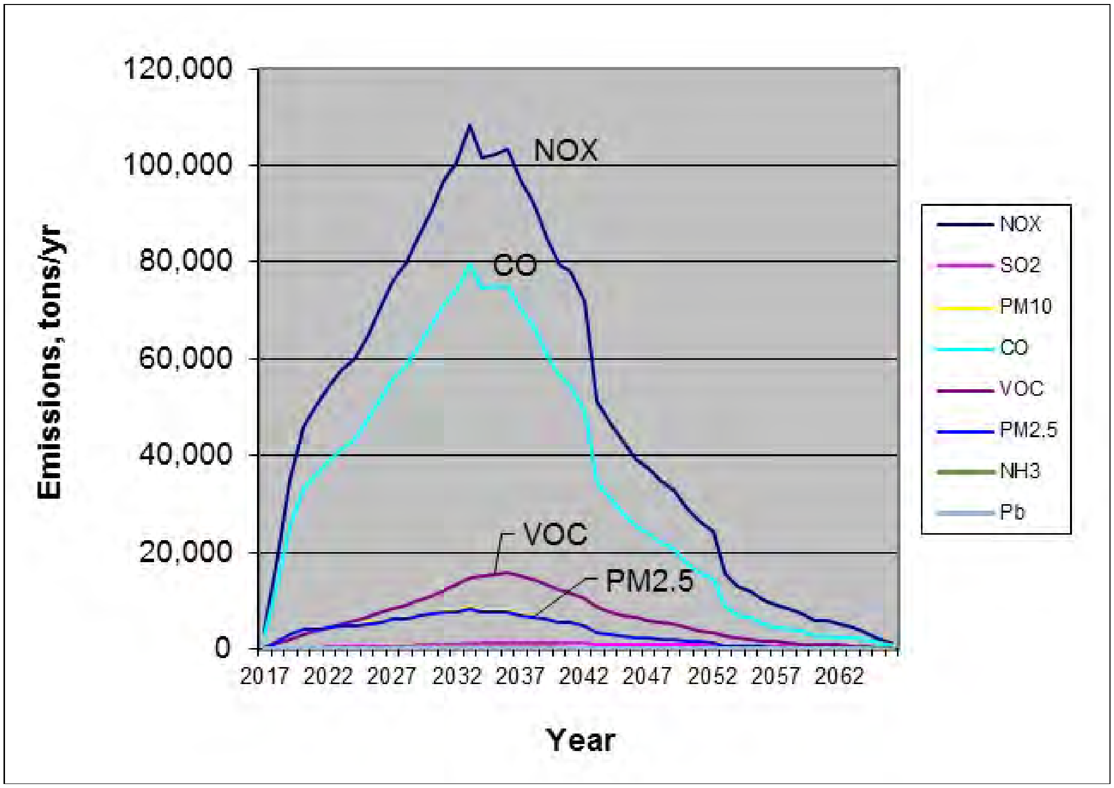

Figure G-11. Emission Estimates for all Planning Areas and Future Activities.

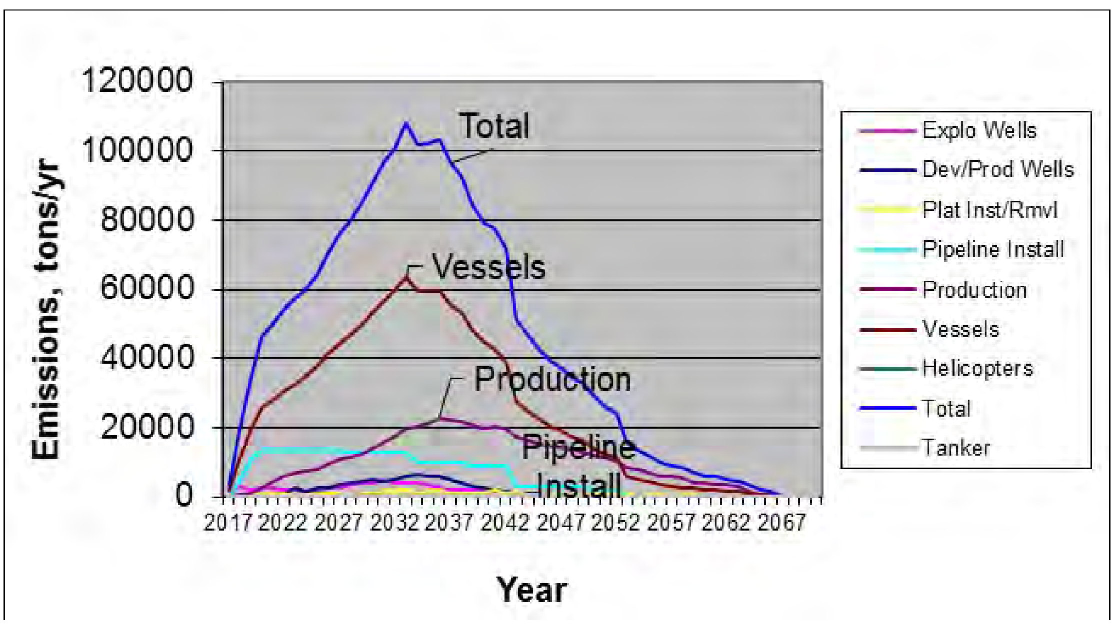

Figure G-12. Combined Annual NO_x Emissions.

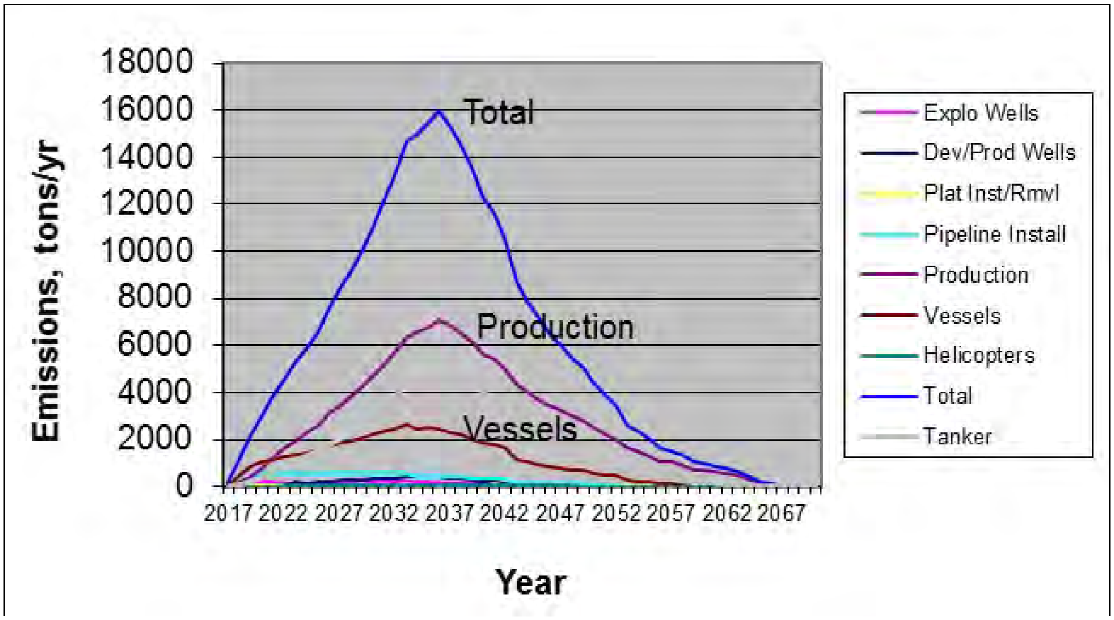

Figure G-13. Combined Annual VOC Emissions.

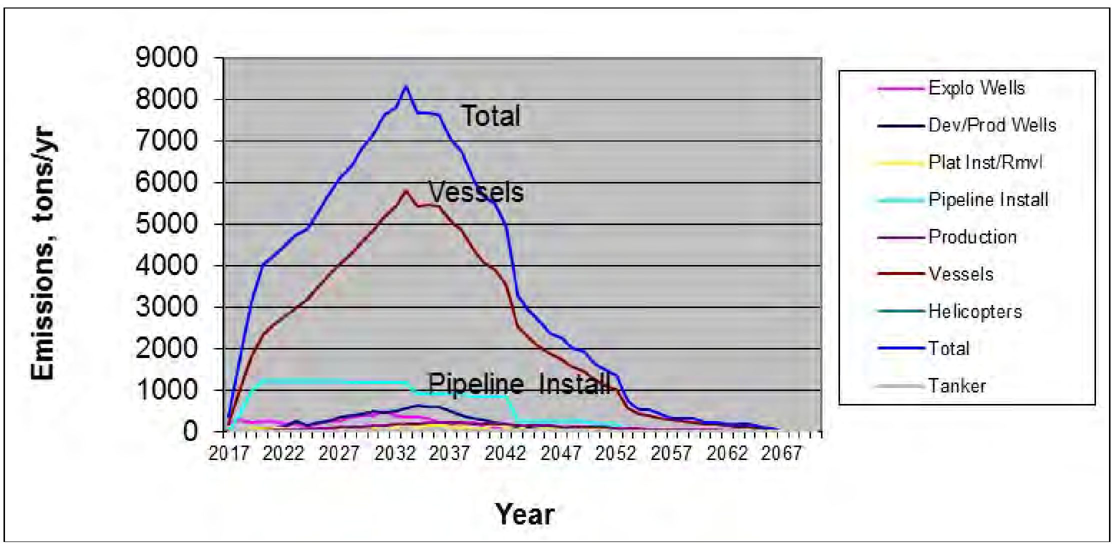

Figure G-14. Combined Annual $PM_{2.5}$ Emissions.

G.4.1.5 Spatial Allocation

The estimated emissions were allocated by planning area (WPA vs. CPA/EPA) and water depth (i.e., 0-60 m, 60-200 m, 200-800 m, 800-1,600 m, 1,600-2,400 m, and >2,400 m). **Figure G-15** depicts the planning area boundaries and water depth contours. (Note that the GOMESA Congressional Moratoria Area is not indicated in **Figure G-15**.) Emissions were not allocated to the GOMESA. The emission estimates were allocated spatially based on the anticipated future year activities provided by BOEM. Because helicopters, support vessels, and tankers transit multiple water depths, their emissions were allocated across multiple water depth contours based on assumed installed platform locations.

For some sources, emissions were assigned to unleased blocks in each area (i.e., WPA and CPA/EPA) relative to the water depth where the activity is anticipated to occur. These categories include the following:

- exploratory drilling vessels;
- development/production drilling vessels; and
- production platforms.

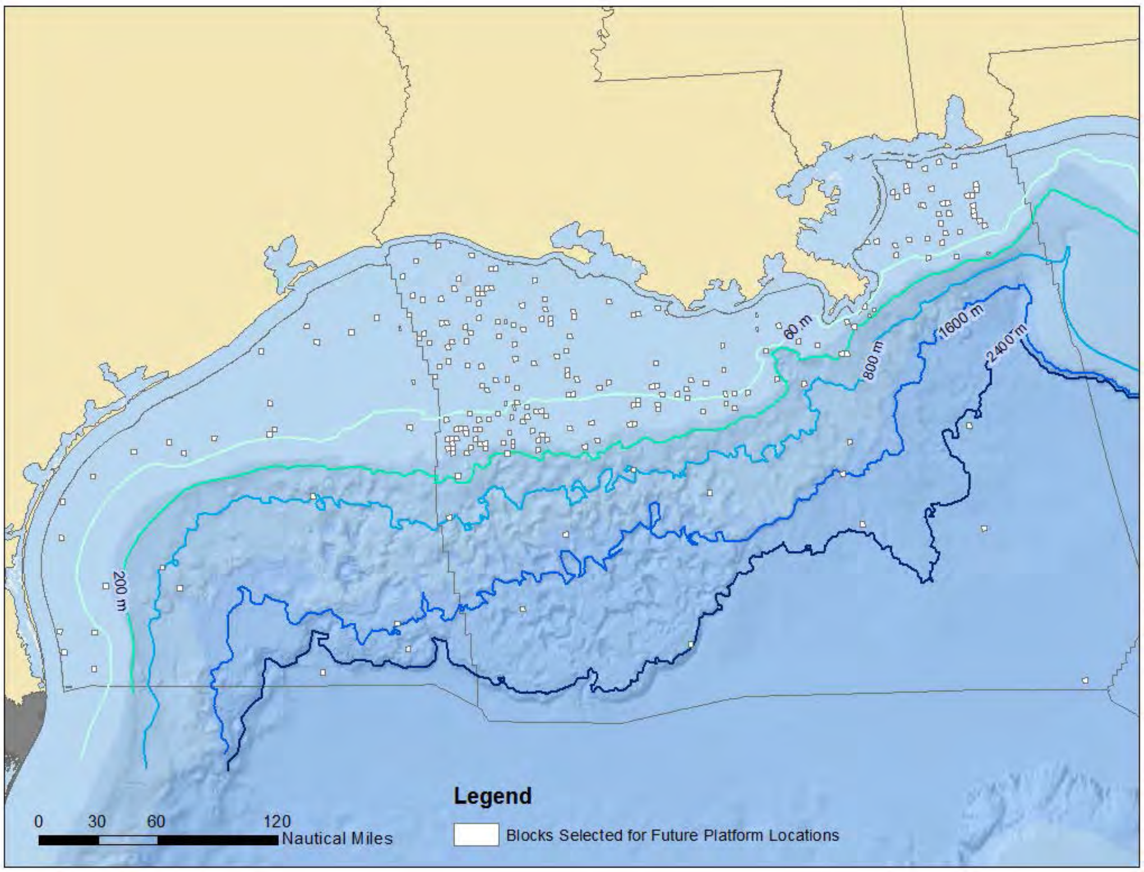

Figure G-15. BOEM OCS Planning Areas and Water Depths.

Production platforms were located as point sources with randomly selected locations. Using GIS, each lease block in the Gulf of Mexico was assigned to a water depth bin. Blocks with an active lease and that have contained a platform were then removed. Blocks that have had a platform suggest that they were leased at some point in time, and therefore are less desirable for future exploration. Once the inactive blocks with no history of production were identified, random blocks were selected throughout each water depth for each future platform as depicted in **Figure G-15**. Each platform was placed in a separate block at the centroid. Pipe-laying vessel activities were assigned to leased and unleased blocks as their operations were not limited to just the unleased blocks.

Emissions associated with BOEM's existing OCS oil and gas production sources were held constant at 2012 levels.

G.4.2 Onshore Sources and Marine Vessels

In support of the proposed ozone NAAQS revisions, the USEPA released the 2011 air quality modeling platform (2011v6.1), with projections to 2018 and 2025, for point, nonpoint area, and mobile sources in the United States (USEPA, 2014d). In addition, the USEPA released the 2011 air quality modeling platform (2011v6.2), with projections to 2017, to support ozone transport modeling for the 2008 NAAQS as well as the 2015 ozone NAAQS (USEPA, 2015d). In early October, 2015, the USEPA also released the 2011v6.2 calendar year 2025 projected inventory (USEPA, 2015d). The ERG team used the 2011v6.2 platform for calendar year 2017, primarily because the platform is based on the most recent version of the NEI (2011v.2). Calendar year 2017 data were selected rather than 2025 data because there is less uncertainty associated with the 2017 estimated emissions because most of the controls factored in by the USEPA are already "on the books" and not speculative. The *Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform* (USEPA 2015d) provides details on the development of the 2011v6.2 future year modeling platforms.

G.4.3 Other Sources

For sources in Mexico, the USEPA air quality modeling platform 2011v6.2 includes projected 2018 emissions for onshore sources. The USEPA held emissions constant for sources in Canada.

For completeness, projected emissions estimates were also developed for platforms off the coast of Mexico; the ERG team researched the impacts of the restructuring of the energy sector in Mexico, which is predicted to include deepwater drilling within the modeling domain. Emissions were estimated based on projected deepwater production (PEMEX, 2012) and using production-based emission factors developed from the 2011 Gulfwide Inventory (Wilson et al., 2014).

For the LOOP and vessel lightering, emissions were held at 2012 levels because of uncertainties in future crude oil imports, which involve the very large crude carriers that visit the LOOP and lightering zones. The ERG team also investigated the need to include a liquefied natural gas (LNG) port to be located in Federal waters and originally expected to be operational in 2019. On September 18, 2015, however, the Maritime Administration (MARAD) and the U.S. Coast Guard stopped the permit application process, as Delphin LNG, LLC is amending the application. This potential source was not included in the future scenario given this uncertainty.

G.5 SOURCE APPORTIONMENT

Source apportionment, as applied in PGM modeling, provides a means of assessing the contributions of specified sources or source groups to predicted ozone and PM concentrations under the air quality conditions being simulated. Source contributions can be calculated for ozone and for PM using ozone or PM source apportionment routines included in the CAMx PGM modeling. In this Study, the primary receptor locations of interest for examining source contributions lie both along the shoreline and the State seaward boundary, although the PGM source apportionment output is for the entire modeling domain. Source apportionment analyses with the PGM will be applied to the future year scenario in order to analyze the pre- and postlease OCS oil and gas impacts to short-term and annual NAAQS. This will afford BOEM the opportunity to discern which source groups have the largest impacts and potentially need to be examined for control strategies. BOEM selected the following source groups for source apportionment:

- fires (U.S., Canada, and Mexico);
- biogenic and other natural sources (e.g., lighting NO_x and sea salt);
- additional BOEM OCS oil and gas production platforms associated with the Five-Year Program;
- additional BOEM oil and gas production support vessels and helicopters associated with the Five-Year Program;
- BOEM OCS oil and gas production platforms, support vessels, and helicopters under No Action (base case) alternative;
- all other marine vessel activity in the Gulf of Mexico;
- other anthropogenic U.S. sources;
- Mexican and Canadian anthropogenic sources; and
- initial and boundary conditions (IC and BC).

These source groups aggregate similar sources based on jurisdiction (i.e., sources under BOEM control versus other Federal agencies) and sources beyond control (e.g., natural emission sources and foreign sources). This is helpful in showing whether BOEM’s sources are significantly contributing to any modeled air quality issues onshore and at the State seaward boundary, or if a source category regulated by another Federal agency is the more likely the problem source.

Having the additional OCS oil and gas production platforms, support vessels, and helicopters associated with the 2017-2022 GOM Multisale EIS scenario as separate source groups allows BOEM to quantify the impact of these sources on the onshore air quality and at the State seaward boundary.

G.6 References

Helicopter Safety Advisory Conference (HSAC). 2015. 2014 Gulf of Mexico Offshore Helicopter Operations and Safety Review. HSAC Helicopter Safety Advisory Committee. Internet website: http://www.hsac.org.

Information Handling Service (IHS). 2015. IHS Vessel Database. Internet website: http://www.ihs.com.

International Maritime Organization (IMO). 2015. Third IMO Greenhouse Gas Study 2014. Internet website: http://www.imo.org/en/OurWork/Environment/PollutionPrevention/AirPollution/Documents/Third%20Greenhouse%20Gas%20Study/GHG3%20Executive%20Summary%20and%20Report.pdf.

Petróleos Mexicanos (PEMEX). 2012. Investor Presentation. April 2012. Internet website: http://www.pemex.com/ri/Publicaciones/Presentaciones%20Archivos/201205_p_inv_e_120508_LA.pdf.

PortVision. 2012. AIS 2011 data provided to the U.S. Bureau of Ocean Energy.

Seelke, C.R., M. Ratner, M.A. Villarreal, P. Brown. 2015. Mexico’s Oil and Gas Sector: Background, Reform Efforts, and Implications for the United States. Congressional Research Service. 7-5700. Internet website: https://www.fas.org/sgp/crs/row/R43313.pdf.

SEMARNAT. 2014. Inventario Nacional de Emisiones de México, 2008. Secretaría del Medio Ambiente y Recursos Naturales (Secretariat of the Environment and Natural Resources). Detailed municipality-level emission files provided by David Alejandro Parra Romero. January 31.

Surface Transportation Board. 2015. R-1 Class 1 Railroad Annual Reporting Data. Internet website: http://www.stb.dot.gov/econdata.nsf/f039526076cc0f8e8525660b006870c9?OpenView.

Switzerland Federal Office of Civil Aviation (FOCA). 2009. Guidance on Determination of Helicopter Emissions. March 2009 Reference: 0/3/33/33-05-20.

United Nations Environment Programme (UNEP). 2012. Intergovernmental Panel on Climate Change, Chapter 7. Aircraft Technology and Its Relation to Emissions. Internet website: http://www.grida.no/publications/other/ipcc_sr/?src=/climate/ipcc/aviation/111.htm.

U.S. Dept of the Interior. Bureau of Ocean Energy Management. 2015. Oil and Gas Operations Reports – Part A (OGOR-A) Well Production (1996-2015). Internet website: https://www.data.boem.gov/homepg/pubinfo/freeasci/product/freeprod_ogora.asp.

U.S. Environmental Protection Agency (USEPA). 1992. Procedures for Emission Inventory Preparation, Volume IV: Mobile Sources. EPA 420-R-92-009. Internet website: http://www3.epa.gov/otaq/models/nonrdmdl/r92009.pdf.

U.S. Environmental Protection Agency (USEPA). 2010. Designation of North American Emission. Control Area to Reduce Emissions from Ships. U.S. Environmental Protection Agency, Office of Transportation and Air Quality. EPA-420-F-10-015. Internet website: http://www.epa.gov/otaq/regs/nonroad/marine/ci/420f10015.pdf.

U.S. Environmental Protection Agency (USEPA). 2014a. SPECIATE Version 4.4. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. Internet website: http://www.epa.gov/ttn/chief/software/speciate/index.html.

U.S. Environmental Protection Agency (USEPA). 2014b. 2011 NEI Nonpoint Emission Estimation Tools and Methods. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards. Internet website: http://www.epa.gov/ttn/chief/net/2011inventory.html#inventorydoc.

U.S. Environmental Protection Agency (USEPA). 2014c. MOVES2014. U.S. Environmental Protection Agency. Internet website: http://pubweb.epa.gov/otaq/models/moves/.

U.S. Environmental Protection Agency (USEPA). 2014d. Ozone NAAQS Emissions Modeling Platform (2011 v6.1). 2011, 2018, and 2025 Emissions Modeling Platform Technical Support Document. Internet website: http://www3.epa.gov/ttn/chief/emch/index.html.

U.S. Environmental Protection Agency (USEPA). 2015a. 2011 National Emissions Inventory (NEI), Version 2. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Air Quality Assessment Division, Emission Inventory and Analysis Group, Research Triangle Park, NC. Internet website: http://www.epa.gov/ttn/chief/eiinformation.html.

U.S. Environmental Protection Agency (USEPA). 2015b. 2012 National Emissions Inventory (NEI). Provided by the U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Air Quality Assessment Division, Emission Inventory and Analysis Group, Research Triangle Park, NC. Internet website: http://www.epa.gov/ttn/chief/eiinformation.html.

U.S. Environmental Protection Agency (USEPA). 2015c. Toxics Release Inventory (TRI) Program. U.S. Environmental Protection Agency, Office of Environmental Information, Washington, DC. Internet website: http://www2.epa.gov/toxics-release-inventory-tri-program.

U.S. Environmental Protection Agency (USEPA). 2015d. Technical Support Document (TSD) Preparation of Emissions Inventories for the Version 6.2, 2011 Emissions Modeling Platform. Internet website: https://www.epa.gov/air-emissions-modeling/2011-version-62-platform.

U.S. Environmental Protection Agency (USEPA). 2016a. Green Book Nonattainment Areas, 8 Hour Ozone Nonattainment Areas (2008 Standard). Internet website: https://www3.epa.gov/airquality/greenbook/map8hr_2008.html.

U.S. Environmental Protection Agency (USEPA). 2016b. 2014 National Emissions Inventory (NEI) Documentation. U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC. Internet website: https://www.epa.gov/air-emissions-inventories/2014-national-emissions-inventory-nei-documentation.

Wilson, D., R. Billings, R. Chang, H. Perez, and J. Sellers. 2014. Year 2011 Gulfwide Emissions Inventory Study. U.S. Department of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2014-666. 182 pp.

APPENDIX H

AIR QUALITY:
CUMULATIVE AND VISIBILITY IMPACTS

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ABBREVIATIONS AND ACRONYMS

ANC	acid neutralizing capacity
AQRV	air quality related value(s)
BLM	Bureau of Land Management (U.S. Department of the Interior)
CAMx	Comprehensive Air quality Model with eXtensions
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
DAT	Deposition Analysis Threshold
dv	deciview
DVB	design value for base year
DVC	design value for current (base) year
DVF	design value for future year
FLAG	Federal Land Managers' Air Quality Related Values Workgroup
GHG	greenhouse gas
HAP(s)	hazardous air pollutant(s)
hp	horsepower
hr	hour(s)
IMPROVE	Interagency Monitoring of Protected Visual Environments
kg/ha-yr	kilogram(s) per hectare - year
km	kilometer(s)
m	meter(s)
MATS	Modeled Attainment Test Software
mcf	Thousand cubic feet
MDA_8	Annual 4^{th} highest daily maximum running 8-hour average (concentration)
Mm^{-1}	inverse megameters
N_2O	Nitrous oxide
NAAQS	National Ambient Air Quality Standards
NO_2	nitrogen dioxide
NO_x	total oxides of nitrogen
O_3	ozone
$PM_{2.5}$	fine particulate matter (less than 2.5 microns in effective diameter)
PM_{10}	inhalable particulate matter (less than 10 microns in effective diameter)
ppb	parts per billion
ppm	parts per million
PSD	Prevention of Significant Deterioration
RRF	Relative Reduction Factor
SO_2	sulfur dioxide
tpy	tons per year
UAA	Unmonitored Area Analysis

USDOI	United States Department of the Interior
USEPA	United States Environmental Protection Agency
VOC	volatile organic compounds
WRF	Weather Research and Forecasting model
yr	year
μeq/l	microequivalent(s) per liter
$\mu g/m^3$	microgram(s) per cubic meter

H AIR QUALITY: CUMULATIVE AND VISIBILITY IMPACTS

H.1 INTRODUCTION

The U.S. Department of the Interior's Bureau of Ocean Energy Management (BOEM) is required under the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. § 1334(a)(8)) to comply with the National Ambient Air Quality Standards (NAAQS) to the extent that Outer Continental Shelf (OCS) offshore oil and gas exploration, development, and production sources do not significantly affect the air quality of any state. The Gulf of Mexico OCS Region's area of possible influence includes the States of Texas, Louisiana, Mississippi, Alabama, and Florida. BOEM's Gulf of Mexico OCS Region manages the responsible development of oil, gas, and mineral resources for the 430 million acres in the Western, Central, and Eastern Planning Areas (WPA, CPA, and EPA) on the OCS comprising the Gulf of Mexico region, including the areas under moratoria (shown in **Figure** H-1). The Clean Air Act Amendments (CAAA) of 1990 designate air quality authorities in the Gulf of Mexico OCS Region, giving BOEM air quality jurisdiction westward of 87°30'W. longitude and the U.S. Environmental Protection Agency (USEPA) air quality jurisdiction eastward of 87°30'W. longitude. In 2006, oil and gas leasing operations within 125 miles (201 kilometers [km]) off the Florida coastline were placed under moratoria until 2022 under the Gulf of Mexico Energy Security Act (GOMESA). The GOMESA moratoria area is depicted on **Figure H-1**.

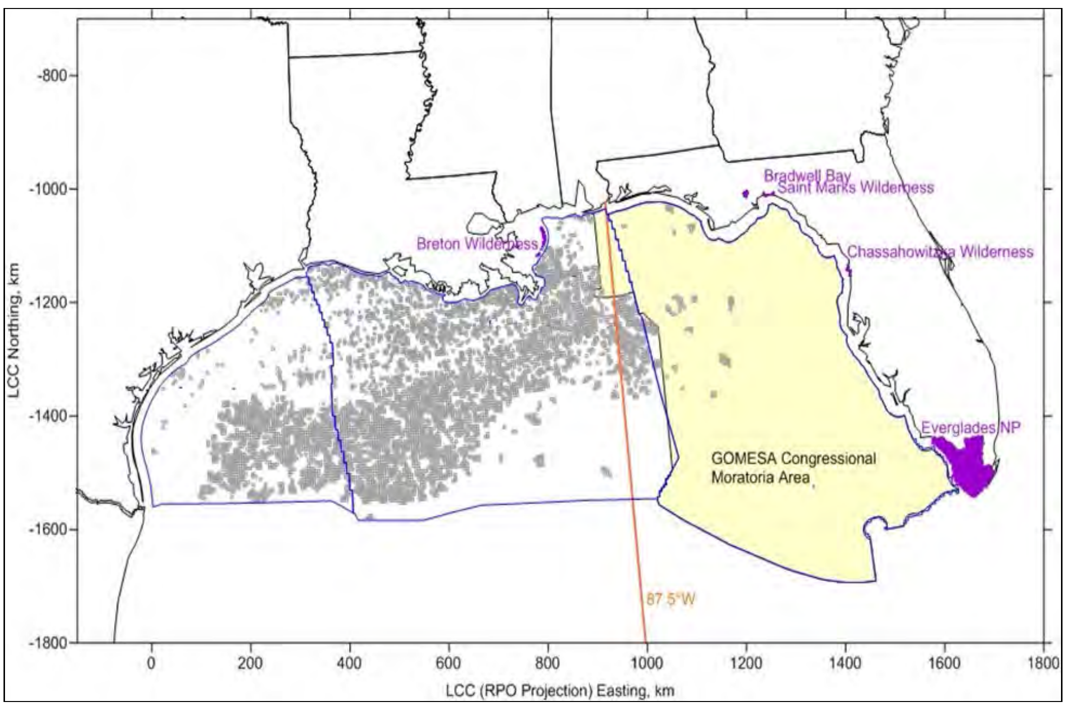

Figure H-1. Location of the "Air Quality Modeling in the Gulf of Mexico Region" Study, with Class I Areas (purple).

BOEM is currently developing the *Gulf of Mexico OCS Oil and Gas Lease Sales: 2017-2022; Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261—Final Multisale Environmental Impact Statement* (2017-2022 GOM Multisale EIS) for oil and gas resources under its jurisdiction within the Gulf of Mexico's WPA, CPA, and EPA (the Proposed Action).

On August 26, 2014, BOEM contracted with Eastern Research Group, Inc. (ERG) and team members Ramboll Environ US Corporation (Ramboll Environ) and Alpine Geophysics, LLC (Alpine) to complete a comprehensive air quality modeling study in the Gulf of Mexico OCS region. Under BOEM Contract Number M14PC00007, "Air Quality Modeling in the Gulf of Mexico Region," photochemical air quality modeling was conducted to assess impacts to nearby states of OCS oil and gas exploration, development, and production as required under OCSLA. This assessment is being used by BOEM to disclose potential incremental and cumulative air quality impacts of a proposed action in the 2017-2022 GOM Multisale EIS. This Technical Support Document (TSD) provides a detailed description of the data, modeling procedures, and results of the Air Quality Impact Analysis (AQIA). BOEM will use this information to complete its analysis of potential impacts of a proposed action on air quality in the 2017-2022 GOM Multisale EIS.

H.1.1 Background on Air Quality Impact Analyses and Thresholds

This analysis examines the potential impacts of the 2017-2022 GOM Multisale EIS scenario with respect to the following:

- the NAAQS for the criteria pollutants ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), fine particulate matter with aerodynamic diameter less than 2.5 µm ($PM_{2.5}$) and fine plus coarse particulate matter with aerodynamic diameters less than 10 µm (PM_{10});
- air quality related values (AQRV), including visibility and acid deposition (sulfur and nitrogen) in nearby Class I and sensitive Class II areas (as defined below); and
- incremental impacts of Prevention of Significant Deterioration (PSD) pollutants (NO_2, PM_{10}, $PM_{2.5}$) with respect to PSD Class I and Class II increments.

Note that the PSD increments are provided here for information purposes, but this analysis does not constitute a regulatory PSD increment consumption analysis as would be required for major sources subject to the New Source Review (NSR) program requirements of the Clean Air Act.

Results of each impact analysis are compared with applicable "thresholds of concern," which have typically been used in air quality impact evaluations of other Federal actions, including onshore oil and gas leasing programs. The applicable comparison thresholds for criteria pollutant impacts are the corresponding NAAQS. For acid (i.e., sulfur and nitrogen) deposition impacts, thresholds are based on (a) incremental impacts considered sufficiently small as to have no consequential effect on the receiving ecosystems, i.e., Deposition Analysis Thresholds, and (b) critical load levels above which cumulative ecosystem effects are likely to or have been observed. For visibility impacts, thresholds are based on incremental changes in light extinction below the level at which they would be noticeable to the average human observer. Additional information about these various thresholds is provided in relevant sections in the remainder of this appendix.

H.1.1.1 Ambient Air Quality Standards

The USEPA has set NAAQS for six regulated air quality pollutants: ozone, particle pollution ($PM_{2.5}$ and PM_{10}), SO_2, NO_2, CO, and lead (Pb). After promulgation of a NAAQS, the USEPA designates areas that fail to achieve the NAAQS as nonattainment areas (NAAs), and States are required to submit State Implementation Plans (SIPs) to the USEPA that contain emission control plans and a demonstration that the NAA will achieve the NAAQS by the required date. After an area comes into attainment of the NAAQS, the area can be redesignated as a maintenance area and must continue to demonstrate compliance with the NAAQS.

In 1997, the USEPA promulgated the first 8-hour ozone NAAQS with a threshold of 0.08 parts per million (ppm) (84 parts per billion [ppb]). On March 12, 2008, the USEPA promulgated a more stringent 0.075 ppm (75 ppb) 8-hour ozone NAAQS. **Figure H-2** presents the current ozone nonattainment areas in the southeastern U.S. On October 1, 2015, the USEPA strengthened the 8-hour NAAQS for ozone to 0.07 ppm (70 ppb). Under this more stringent ozone NAAQS, there may be more areas in the southeastern U.S. that will be in nonattainment. The USEPA plans to make attainment and nonattainment designations for the revised standards by October 2017, with the designations based on 2014-2016 air quality data.

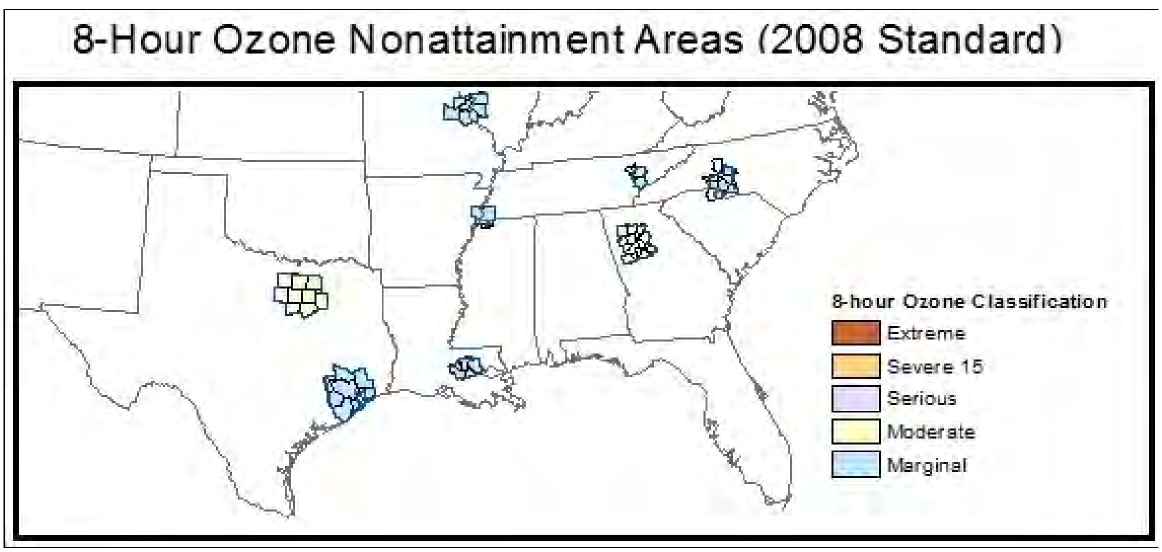

Figure H-2. Ozone Nonattainment Areas in the Southeastern U.S. (Source: USEPA, 2016; https://www3.epa.gov/airquality/greenbook/map8hr_2008.html).

On December 14, 2012, the USEPA revised the $PM_{2.5}$ primary NAAQS by lowering the annual $PM_{2.5}$ NAAQS threshold from 15.0 micrograms per cubic meter (µg/m^3) to 12.0 µg/m^3. The USEPA retained the 24-hour $PM_{2.5}$ primary NAAQS at 35 µg/m^3. The 24-hour course PM NAAQS (PM_{10}) was also retained at 150 µg/m^3.

In February 2010, the USEPA issued a new 1-hour NO_2 NAAQS with a threshold of 100 ppb (98th percentile daily maximum 1-hour average averaged over 3 years) and a new 1-hour SO_2 NAAQS was promulgated in June 2010 with a threshold of 75 ppb (99th percentile daily maximum 1-hour average averaged over 3 years). No areas are currently in nonattainment of either the annual or 1-hour NO_2 NAAQS. On July 25, 2013, the USEPA designated 29 areas in 16 states as nonattainment for the 1-hour SO_2 standard.[1] In June 2016, four additional areas were designated as nonattainment (Madison and Williamson Counties in southern Illinois, Anne Arundel-Baltimore Counties in Maryland and St. Clair County in Michigan).[2] The USEPA is currently in the process of gathering more information needed to complete designation of remaining unclassifiable areas with respect to the 1-hour SO_2 NAAQS.

A new lead NAAQS was issued in 2008; NAAs for lead are associated with specific industrial sources. As oil and gas sources in the Gulf of Mexico OCS region produce negligible amounts of lead emissions and to be consistent with onshore oil and gas analysis, which does not include lead, lead emissions were calculated but lead was not included in the air quality analysis. The NAAQS for carbon monoxide has remained essentially unchanged since it was originally promulgated in 1971. As of September 27, 2010, all NAAs for carbon monoxide have been redesignated as maintenance areas.

Table H-1 summarizes the nonattainment and maintenance areas in the southeastern U.S. SO_2 and lead NAAs are focused around specific large industrial sources of SO_2 or lead emissions, whereas ozone nonattainment areas are more regional in nature, reflecting the formation of ozone as a secondary pollutant from emissions of NO_x and VOC precursors from a wide range of sources.

Table H-1. Nonattainment and Maintenance Areas in the Southeastern U.S.

State	Area	8-hr O_3 (1997)	8-hr O_3 (2008)	SO_2 (2010)	CO (1971)	Lead (2008)
Alabama	Troy, AL					NAA[a]
Florida	Tampa, FL					NAA
	Hillsborough County, FL			NAA		
	Nassau County, FL			NAA		
Louisiana	Baton Rouge, LA	M[b]	NAA			
	St. Bernard Parish, LA			NAA		
Texas	Beaumont-Port Arthur, TX	M				
	Houston-Galveston-Brazoria, TX	NAA	NAA			
	Frisco, TX					NAA

[1] https://www.epa.gov/sites/production/files/2016-03/documents/20130725fs.pdf
[2] https://www.epa.gov/sites/production/files/2016-06/documents/so2d-r2-area-list.pdf

State	Area	8-hr O_3 (1997)	8-hr O_3 (2008)	SO_2 (2010)	CO (1971)	Lead (2008)

[a] NAA = nonattainment area.
[b] M = maintenance area.
Blank cells indicate the area is in attainment of the NAAQS.

H.1.1.2 Air Quality Related Values

The CAAA designated 156 Class I areas consisting of National Parks and Wilderness Areas that are offered special protection for air quality and AQRVs. The Class I areas, compared to Class II areas, have lower PSD increments that new sources may not exceed and are protected against excessive increases in several AQRVs including visibility impairment, acid (sulfur and nitrogen) deposition, and nitrogen eutrophication. The Regional Haze Rule (RHR) specifies a goal of achieving “natural” visibility conditions by 2064 in Class I areas, and States must submit RHR SIPs that demonstrate progress towards that goal. **Figure H-1** displays the locations of the mandatory Class I areas (in purple) in the Gulf of Mexico OCS region.

In addition to the Class I areas described above, Federal Land Management (FLM) agencies have designated certain other areas as Class II sensitive areas for tracking PSD increment consumption and AQRV impacts. Sensitive Class II areas in the southeastern U.S. Study region are shown in **Figure H-3**.

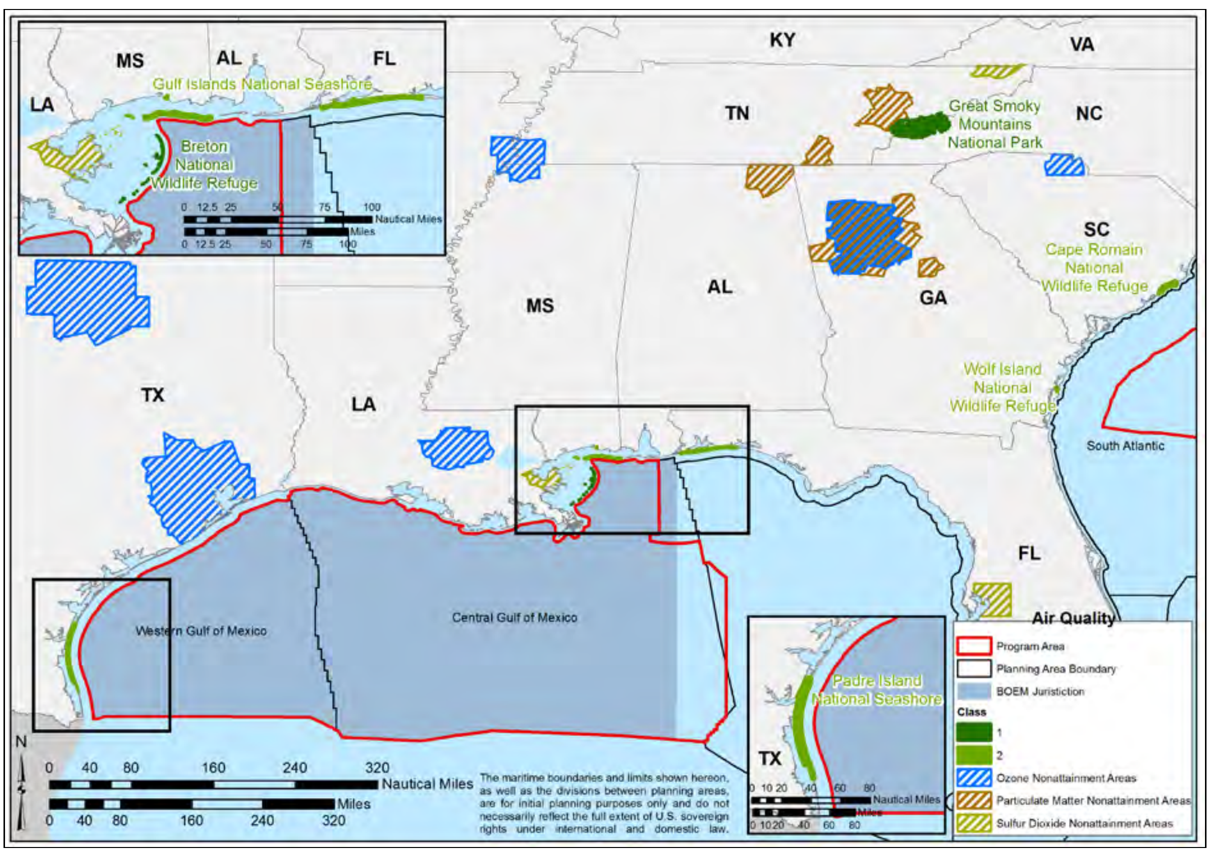

Figure H-3. Class I and Sensitive Class II Areas in the Study Region.

H.1.2 Overview of Approach

The Comprehensive Air-quality Model with extensions (CAMx; www.camx.com) and Community Multiscale Air Quality (CMAQ; https://www.cmascenter.org/cmaq/) Photochemical Grid Models (PGMs) were used to simulate the dispersion and chemical transformation of pollutants over the Study area. Similar to other air quality models, CAMx/CMAQ require several input datasets, including meteorology and an emissions inventory. **Figure H-4** presents an overview of how these project datasets fit together for the "Air Quality Modeling in the Gulf of Mexico OCS Region" study. Preparation of the required meteorological and emissions data is described briefly in this TSD, along with references to more detailed reports.

Photochemical modeling was conducted for two emission scenarios:

- a base case scenario using the 2012 base year (BY) emissions inventory described in **Section H.3** was used to evaluate model performance and to define current baseline air quality conditions; and
- a future year development scenario (FY) using an emissions inventory that includes potential new sources associated with the 2017-2022 GOM Multisale EIS and projections of emissions to 2017 for all other sources as described in **Section H.3** was used to estimate the cumulative and incremental air quality and AQRV impacts of the 2017-2022 GOM Multisale EIS scenario.

Note that both scenarios used the same meteorological dataset and the same photochemical model configuration.

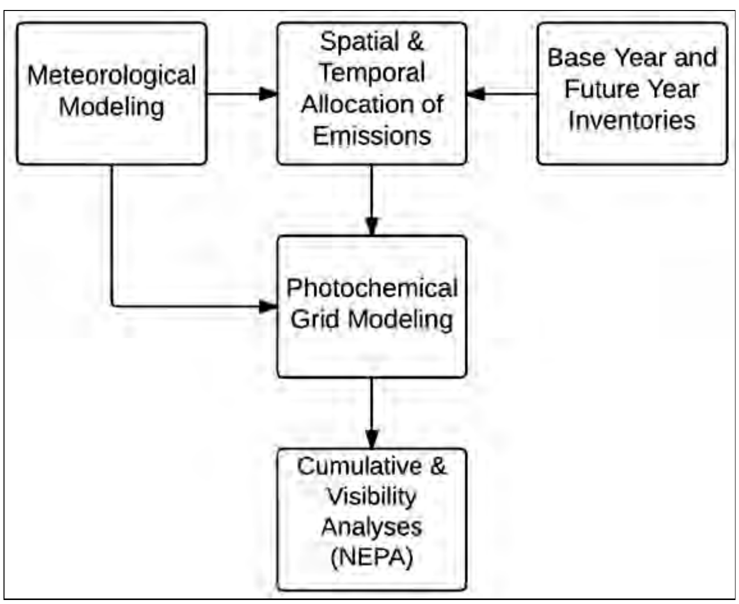

Figure H-4. Overview of the "Air Quality Modeling in the Gulf of Mexico Region" Study Tasks (note that the meteorological model takes meteorological observations as inputs).

H.2 METEOROLOGY

Meteorological datasets required to determine the rate that pollutants disperse and react in the atmosphere include spatially and temporally varying parameters such as wind speed, wind direction, air temperature, and humidity, among others. Sources of meteorological information include datasets of measurements gathered at various locations within the Gulf of Mexico OCS Region domain. However, the spatial coverage of measurements is insufficient to describe the three-dimensional structure of the atmosphere away from measurement locations. Using measurement data as inputs, gridded meteorological models capable of simulating the fluid dynamics of the atmospheric can be used to estimate meteorological conditions over a complete modeling domain—including regions far from measurement sites—in a physically consistent fashion. Results of these meteorological models provide the inputs needed to exercise the photochemical grid air quality dispersion models used in this Study. For this “Air Quality Modeling in the Gulf of Mexico Region” study, the Advanced Research version of the Weather and Research Forecasting (WRF) model (version 3.7) was applied over a system of nested modeling grids. **Figure H-5** shows the WRF modeling grids at horizontal resolutions of 36, 12, and 4 km. All WRF grids were defined on a Lambert Conformal Conic (LCC) projection centered at 40°N. latitude, 97°W. longitude with true latitudes at 33°N. and 45°N. (the “standard RPO” projection). The outermost domain (outer box) with 36-km resolution includes the entire continental U.S. and parts of Canada and Mexico, and captures synoptic-scale (storm system-scale) structures in the atmosphere. The inner 12-km regional grid (d02) covers the southeastern U.S. and is used to ensure that large-scale meteorological patterns across the region are adequately represented and to provide boundary conditions to the 4-km domain. The 4-km domain (d03) is centered on the coastal areas of the southeastern U.S. and over-water portions of the Gulf of Mexico.

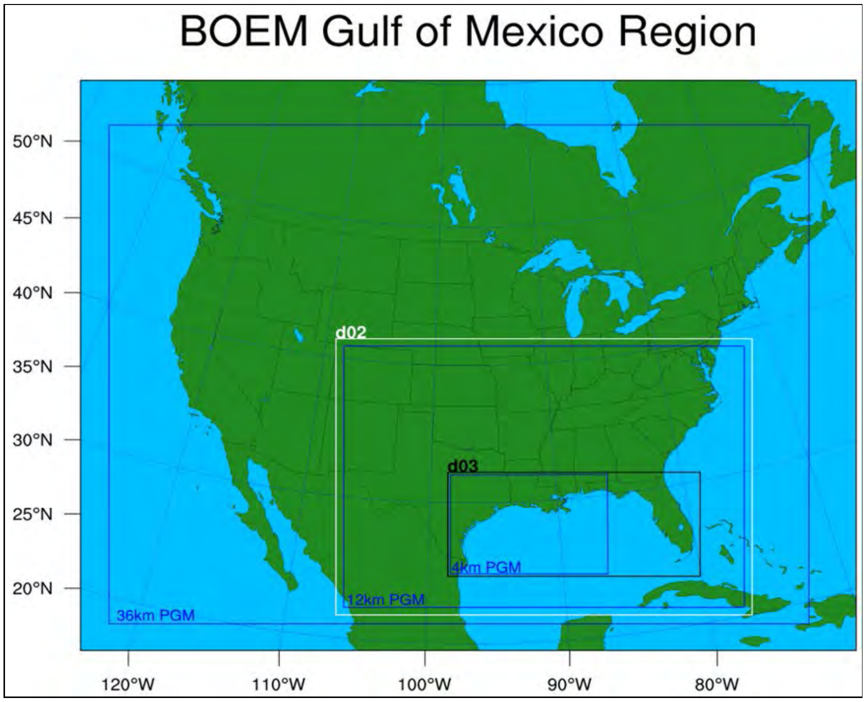

Figure H-5. Meteorological (WRF model) and PGM Modeling Domains Including the 36-km Horizontal Grid Resolution CONUS WRF Domain (outer box), 12-km Resolution Southeast Regional WRF (white) and PGM (blue) Domains (d02), and 4-km Resolution Gulf of Mexico OCS Region WRF (black) and PGM (blue) Domains (d03).

The WRF ran the 36-, 12- and 4-km grids simultaneously with one-way nesting, meaning that meteorological information flows down-scale via boundary conditions introduced from the respective coarser to finer grids without feedback from the finer to coarser grids. The WRF modeling domain was defined to be slightly larger than the CAMx/CMAQ PGM modeling domains to eliminate boundary artifacts in the meteorological fields. Such boundary artifacts occur for both numerical reason (the 3:1 grid spacing ratio) and because the imposed boundary conditions require some time/space to come into dynamic balance with WRF's atmospheric equations. All meteorological modeling domains, techniques, inputs, vertical resolution, parameters, nudging, physics options, and application strategy, along with quantitative and qualitative evaluation procedures and statistical benchmarks, are discussed in **Appendix F**.

H.3 EMISSIONS

Analysis of the cumulative air quality impacts of the 2017-2022 GOM Multisale EIS scenario required development of both a contemporary base year emissions inventory for the base case analysis and a projected future year inventory that includes emissions from all cumulative sources, as well as additional emissions anticipated to occur under the 2017-2022 GOM OCS Multisale EIS alternatives in which additional exploratory drilling and construction of new shallow-water and deepwater platforms to support oil and gas production would occur. Both the base case and future year cumulative source inventories represent comprehensive compilations of pollutant emissions from all human activities, as well as emissions from biogenic and geogenic sources.

The scope of the air pollutant emissions inventory for the "Air Quality Modeling in the Gulf of Mexico Region" study is defined in terms of: pollutants, representative time periods for the base case and future year analysis, geographical domain, and sources to be included.

H.3.1 Pollutants

Pollutants included in the inventories were selected to support analysis of air quality impacts in terms of impacts on attainment of NAAQS and on AQRVs, including acid deposition and visibility. The selected pollutants are: CO, NO_x (which includes NO and NO_2 and is stated in terms of equivalent mass of NO_2), $PM_{2.5}$, fine plus coarse PM (PM_{10}), SO_2, volatile organic compounds (VOCs, which are precursors to formation of ozone and organic particulates), and ammonia (NH_3, a precursor to particulate matter formation). Note that lead emissions were calculated since lead is a criteria pollutant, but since oil and gas sources have negligible lead emissions, it was not modeled in the air quality analysis.

While the cumulative air quality impact analysis did not focus specifically on air toxics, compilation of VOC emissions by source type together with VOC speciation profiles by source type provides a mechanism for estimating emissions of individual air toxic species.

H.3.2 Base Year

In determining the base case (base year) for the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory, 2011 was initially selected based on data availability. Calendar year 2011 emissions data are readily available for most sources from the USEPA's National Emissions Inventory (NEI) (USEPA, 2015a) and BOEM's *Year 2011 Gulfwide Emissions Inventory Study* (Wilson et al., 2014). However, 2011 was an unusually hot and dry year in the Gulf of Mexico OCS region, particularly in Texas, which experienced record heat and dry conditions during the summer of 2011 and had a very high incidence of wildfires. Therefore, 2012 was selected as the base year as more representative of "typical" conditions in the Gulf of Mexico OCS region.

H.3.3 Geographical Domain

Modeling domains used for the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory are depicted in **Figure H-5**. Emissions were spatially allocated over the three PGM modeling domains: an outer 36-km horizontal grid resolution domain covering all of the U.S. and parts of Mexico and Canada; a regional 12-km resolution domain covering the southeastern U.S.; and an inner 4-km domain encompassing the CPA and WPA. The influences of global emissions on the study area are accounted for by the use of a global air quality model to specify domain boundary conditions.

H.3.4 Inventory Sources

A comprehensive inventory of emissions from anthropogenic (i.e., human caused) sources, including stationary point and nonpoint area sources located both onshore and offshore, onroad motor vehicles, nonroad equipment, locomotives, marine vessels and other offshore sources, and airports, were compiled for the "Air Quality Modeling in the Gulf of Mexico Region" study emissions inventory. **Table H-2** lists the source categories included in the emissions inventory, along with the pollutants applicable to each category, and the source type (area source, point source, offshore lease block). Note that emissions from non-anthropogenic sources (biogenic and geogenic sources) were developed in conjunction with the emissions modeling procedures described in **Section H.3.9**.

Table H-2. Gulf of Mexico OCS Region Air Quality Modeling Study Source Categories.

Group and Source Category		CO	NO_x	SO_2	VOC	Pb	$PM_{2.5}$	PM_{10}	NH_3	Source Type[a]
NEI Onshore Sources	Point Sources	✓	✓	✓	✓	✓	✓	✓	✓	P
	Nonpoint Area Sources	✓	✓	✓	✓	✓	✓	✓	✓	A
	Onroad Mobile Sources	✓	✓	✓	✓		✓	✓	✓	A
	Commercial Marine Vessels	✓	✓	✓	✓	✓	✓	✓	✓	P, A[b]
	Locomotives	✓	✓	✓	✓	✓	✓	✓	✓	P, A[c]
	Aircraft and Airports	✓	✓	✓	✓	✓	✓	✓	✓	P
	Other Nonroad Mobile Sources	✓	✓	✓	✓		✓	✓	✓	A
Offshore Oil and Gas Sources	Platforms in State Waters	✓	✓	✓	✓		✓	✓		P
	Platforms in the CPA and WPA	✓	✓	✓	✓	✓	✓	✓	✓	P
	Drilling Rigs	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Pipelaying Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Support Helicopters	✓	✓	✓	✓		✓	✓	✓	LB
	Support Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Survey Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
Non-oil & Gas Offshore Vessels and Activities	Commercial Fishing Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Commercial Marine Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Louisiana Offshore Oil Port	✓	✓	✓	✓	✓	✓	✓	✓	P
	Military Vessels	✓	✓	✓	✓	✓	✓	✓	✓	LB
	Recreational Vessels	✓	✓	✓	✓		✓	✓	✓	LB

Group and Source Category		CO	NO_x	SO_2	VOC	Pb	$PM_{2.5}$	PM_{10}	NH_3	Source Type[a]
	Vessel Lightering	✓	✓	✓	✓	✓	✓	✓	✓	P
Biogenic and Geogenic Sources	Subsurface Oil Seeps				✓					LB
	Mud Volcanoes				✓					LB
	Onshore Vegetation		✓		✓					A
	Wildfires and Prescribed Burning	✓	✓	✓	✓		✓	✓	✓	P
	Windblown Dust						✓	✓		A
	Lightning		✓							A
	Sea Salt Emissions						✓	✓		A
Sources in Mexico and Canada	Point Sources	✓	✓	✓	✓		✓	✓	✓	P
	Nonpoint Area Sources	✓	✓	✓	✓		✓	✓		A
	Mobile Sources	✓	✓	✓	✓		✓	✓		A

[a] A = area source (requires spatial surrogate); P = point source (requires UTM coordinates, stack parameters); LB = offshore lease block (requires GIS shape file).
[b] Larger ports and shipping represented as shape files; smaller ports as point sources.
[c] Rail yards represented as point sources; railway segments as area sources.

H.3.5 Spatial Resolution

The spatial resolution of the emissions inventory is source specific. For example, sources such as power plants are identified based on their geographic coordinates (i.e., latitude and longitude), while other sources such as nonroad mobile sources (e.g., construction equipment) are spatially distributed using surrogates within the county in which they are reported and that are typically related to the activity distribution of the category (e.g., construction sites).

The resolution of the geographical area covered by the emissions inventory is based on the grid cell size needed for photochemical and dispersion modeling. Furthermore, the photochemical model grid resolution is dependent on the grid resolution of the WRF meteorological model output used. This is described further in **Section H.3.9**.

H.3.6 Temporal Resolution

Emissions for all sources were estimated on an annual basis (i.e., emissions generated during 2012). For electric generating units (EGUs), emissions were allocated on a sub-annual basis to reflect variations in activity using data from the USEPA. Emissions were allocated on an hourly, daily, and seasonal basis during the emissions modeling process (**Section H.3.9**) using default temporal allocation factors provided with the Sparse Matrix Operator Kernel Emissions model (SMOKE) emissions model for some sources; other temporal allocations were source specific; and profiles were developed and applied within the SMOKE model.

H.3.7 Speciation

When applying the photochemical grid modeling, PM emissions were allocated to individual PM species as part of the SMOKE emissions processing using PM speciation factors obtained from the USEPA's SPECIATE database for each source category (as defined by the Source Classification Code). This resulted in the PM mass being broken into the mass associated with elemental carbon (EC), organic aerosol (OA), primary sulfate (SO_4) and nitrate (NO_3) and other elements, and particle-bound VOCs, such as polycyclic aromatic hydrocarbon (PAHs). The model predictions of EC will undergo for further analysis and discussed in the "Air Quality Modeling in the Gulf of Mexico Region" study final report.

SMOKE was also used to convert VOC emissions into the photochemical mechanism-specific (e.g., CB05 or CB6r2h) model species used in air quality models as described in **Section H.3.9.** The CB6r2h chemical mechanism used in CAMx also models excess methane (ECH_4) from local sources that is added to the background methane value (1.75 ppm) in the chemical mechanism. The excess methane species is calculated as part of the speciation of the VOC emissions that are first adjusted to total organic gases (TOG) before calculating the CB6 chemical species. Thus, the excess methane species only includes methane emissions from local VOC sources (e.g., oil and gas) and will not include methane emissions not associated with VOC sources.

H.3.8 Base Year and Future Year Emission Estimates

Details on the development of the base year and future year emission estimates are presented in **Appendix G**.

H.3.9 Emissions Processing for Preparation of Model-Ready Emissions

H.3.9.1 Smoke Processing

Anthropogenic emissions inventories discussed in the previous section and other data were used to prepare PGM model-ready emission files using the Sparse Matrix Operator Kernel Emissions (SMOKE) system version 3.6 and other methods as described below. The inventories were processed through SMOKE to develop hourly, gridded, and speciated emissions required for input to the PGM models at 36-, 12-, and 4-km grid resolutions. During emissions processing, annual emissions inventories were speciated to model species, temporally allocated to hourly emissions, and spatially allocated to grid cells.

The latest Carbon Bond 6 revision 2h (CB6r2h) photochemical mechanism with active local methane emissions and halogen chemistry was used for the CAMx modeling, whereas the Carbon Bond 5 (CB05) with updated toluene and chlorine chemistry photochemical mechanism was used for the CMAQ modeling, and emissions were processed accordingly. CMAQ versions 5.0 and later contain a thermodynamic equilibrium aerosol mechanism (ISORRPIA v2) that requires detailed speciation of $PM_{2.5}$. This involves splitting PMFINE into additional elemental components.

The SMOKE emissions model was used to perform the following tasks:

- Spatial Allocation: Spatial surrogates contained in the USEPA 2011v6.2 modeling platform[3] were used to spatially distribute emissions to modeling grid cells. Spatial surrogates are generated by overlaying the PGM modeling grid on maps of geospatial indicators appropriate to each source category (e.g., housing units). The Surrogate Tool[4], a component of USEPA's Spatial Allocator system, is used to calculate the fraction of geospatial indicator coverage in each model grid cell.

- Temporal Allocation: Air quality modeling systems, such as CMAQ and CAMx, require hourly emissions input data. With the exception of a few source types (i.e., Continuous Emissions Monitoring data, biogenic emissions, and some fire inventories), most inventory data are estimated in the form of annual or daily emissions. SMOKE was used to allocate annual emissions to months and across the diurnal cycle to account for seasonal, day-of-week and hour-of-day effects. Temporal profiles and SCC cross references from the 2011v6.2 modeling platform were used to incorporate seasonal and monthly variations into the development of the PGM model-ready emissions.

- Chemical Speciation: The emissions inventories for the "Air Quality Modeling in the Gulf of Mexico OCS Region" study included the following pollutants: CO, NO_x, VOC, NH_3, SO_2, PM_{10}, and $PM_{2.5}$. Ramboll Environ used SMOKE to convert inventoried VOC emissions into the CB6r2 photochemical mechanism model species. Chemical speciation profiles were assigned to inventory sources using cross-referencing data that match the profiles and inventory sources using country/state/county (FIPS) and source classification codes (SCCs). Ramboll Environ used NO_x, VOC, and PM speciation profiles from the 2011v6.2 platform for SMOKE processing. In the 2011v6.2 platform, USEPA-generated emissions for Carbon Bond version 6 revision 2 (CB6r2) chemical mechanism used by CAMx. In addition, this platform generates the $PM_{2.5}$ model species associated with the CMAQ Aerosol Module, version 6 (AE6). SMOKE also applied source-specific speciation profiles to convert inventoried NO_x emissions to NO, NO_2, and HONO components. After SMOKE processing, Ramboll Environ applied necessary species mapping to prepare CMAQ-ready emissions in CB05/AE6 terms and CAMx-ready emissions in CB6r2/CF terms. Note that CB6r2 chemistry also models local excess methane (ECH_4) above background concentrations. Sea salt and halogen emissions from the Gulf of Mexico and

[3] http://www.epa.gov/ttn/chief/emch/index.html#2011
[4] https://www.cmascenter.org/sa-tools/documentation/4.2/html/srgtool/SurrogateToolUserGuide_4_2.pdf

other ocean portions of the modeling domain were also generated for CAMx as described below.

H.3.9.2 Biogenic Emissions

Biogenic emissions were generated using the MEGAN version 2.1 biogenics model developed at the National Center for Atmospheric Research (Guenther et al., 2012; Sakulyanontvittaya et al., 2008).

Biogenic emissions depend critically upon landuse/landcover input data. Biogenic VOC and NO emissions vary considerably on spatial scales ranging from a few meters to thousands of kilometers. The MEGAN model accounts for this variability with high-resolution estimates of vegetation type and quantity. The MEGAN landcover variables include total Leaf Area Index (LAI), tree fraction, and plant species composition. These variables are determined based primarily on satellite observations, such as 2003 1 km^2 Moderate Resolution Imaging Spectroradiometer (MODIS) and 30-m resolution LANDSAT data (Guenther et al., 2006; Sakulyanontvittaya et al., 2008). MEGAN driving variables include weather data, LAI, plant functional type (PFT) cover, and compound-specific emission factors that are based on plant species composition. All of these variables are available at various temporal scales and are provided in a geo-referenced gridded database in several formats (e.g., netcdf, ESRI GRID). The MEGAN database has global coverage at 30 sec (approximately 1 km) spatial resolution.

The MEGAN model was applied using the specific daily meteorology (e.g., temperature and solar radiation) extracted from the 2012 WRF model outputs to generate day-specific biogenic emissions for the 2012 calendar year in the 36-, 12-, and 4-km PGM modeling domains.

H.3.9.3 Fire Emissions

Forest fire emissions are highly episodic and very location specific. Using annual average fire emissions and temporally and spatially allocating these emissions using generic allocation schemes would result in significant inaccuracies. In this modeling study, Ramboll Environ used day-specific wild and prescribed fire (together called wildland fires [WLFs]) emission estimates developed by the USEPA for calendar year 2012.[5] The emission estimates are based on the SMARTFIRE2 (SF2) framework and the BlueSky models.[6] The USEPA fire inventory was processed through SMOKE in separate processing streams for CMAQ and CAMx. The CMAQ model-ready emissions were developed in “in-line” point format. The term “in-line” means that the plume rise calculations are done inside the CMAQ model instead of being computed by SMOKE. To prepare CAMx model-ready emissions using a plume rise algorithm that is consistent with the algorithms in CMAQ, plume rise calculation was done in SMOKE and 3-D emissions files were

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[5] ftp://ftp.epa.gov/EmisInventory/fires/
[6] http://www.airfire.org/smartfire/

prepared that were converted into a CAMx "PTSOURCE" type file where each grid cell centroid represents one virtual stack. The CMAQ2UAM program was used to convert 3-D fire emissions from SMOKE into CAMx format. **Table H-3** shows total annual criteria air pollutant emissions by fire type for all US wildland fires within each of BOEM's PGM modeling domains.

Table H-3. 2012 Fire Criteria Air Pollutant Emissions Summary by Fire Type for BOEM's 36-, 12-, and 4-km Domains.

Fire Type (SCC)	Domain	CO (TPY)	NO_x (TPY)	PM_{10} (TPY)	$PM_{2.5}$ (TPY)	SO_2 (TPY)	VOC (TPY)
Wildfires (2810001000)	36 km	59,794	613	5,901	5,001	387	14,050
	12 km	6,568	74	654	554	44	1,545
	4 km	1,087	6	103	87	6	254
Prescribed fires (2810015000)	36 km	27,331	391	2,796	2,370	211	6,453
	12 km	20,126	308	2,077	1,760	161	4,757
	4 km	7,020	58	680	577	41	1,646
Total	36 km	87,125	1,003	8,698	7,371	598	20,503
	12 km	26,694	382	2,731	2,314	206	6,302
	4 km	8,107	64	783	664	47	1,900

As noted above, the USEPA wildland fires inventory is restricted to fire sources within the lower 48 states and thus does not cover the portions of Canada and Mexico lying within the 36-, 12-, and 4-km PGM domains. To fill this gap, we used 2012 day-specific Fire INventory from NCAR (FINN) for Canada and Mexico. The FINN provides daily, 1-km resolution, global estimates of the trace gas and particle emissions from open burning of biomass, which includes wildfire, agricultural fires, and prescribed burning exclusive of biofuel combustion and trash burning. Each fire record was treated as a point source and emissions were distributed vertically into multiple model layers to better represent each fire plume. The day-specific FINN fire emissions in Canada and Mexico were processed to develop elevated "point sources" of fire emissions using plume rise estimates as a function of fire size based on the Western Regional Air Partnership (WRAP) 2002 fire plume rise approach (Mavko and Morris, 2013). The chemical speciation profile for the MODIS fire emissions were derived from a study on biomass burning (Karl et al., 2007).

H.3.9.4 Sea Salt and Halogen Emissions

Ramboll Environ used an emissions processor that integrates published sea spray flux algorithms to estimate sea salt PM emissions for input to CAMx. The gridded data for input to the sea salt emissions model is a land-water mask file that identifies each modeling domain grid cell as open ocean, surf zone, or land. Additional details on the development and evaluation of the sea salt emissions processor that was used for the "Air Quality Modeling in the Gulf of Mexico Region" study are available in the WestJumpAQMS Sea Salt and Lightning memo (Morris et al., 2012). The CAMx sea salt emissions processor was used with the 2012 WRF data to generate sea salt emissions for the 36-, 12-, and 4-km modeling domains. The sea salt emissions processor has recently been updated to also generate emissions for halogen compounds from the ocean (Yarwood et al., 2014). Gridded chlorophyll data is obtained from satellite data is used as input and the processor generated gridded hourly emissions of chlorine, bromine, and iodine. Halogen chemistry over the ocean depletes ozone concentrations near the surface so is especially important in the Gulf of Mexico OCS region.

The CMAQ model includes inline calculation of sea-salt emissions from the open ocean and coastal surf zone so no pre-processing of sea salt emissions is needed. The CMAQ does not treat halogen chemistry except for chlorine.

H.3.9.5 Lightning NO_x Emissions

The NO_x is formed in lightning channels as the heat released by the electrical discharge causes the conversion of nitrogen (N_2) and oxygen (O_2) to NO. Modeling of lightning and its emissions is an area of active research. For example, the mechanism for the buildup of electric potential within clouds is not well understood, and modeling the production, transport, and fate of emissions from lighting is complicated by the fact that the cumulus towers where lightning occurs may be sub-grid scale depending on the resolution of the model. Given the importance of lightning NO_x in the tropospheric NO_x budget and in understanding its effect on upper tropospheric ozone and OH-, lightning NO_x is typically incorporated in global modeling (e.g., Tost et al., 2007; Sauvage et al., 2007; Emmons et al., 2010) and has also been integrated into many regional modeling studies (e.g., Allen et al., 2012; Koo et al., 2010).

For the CMAQ modeling, Ramboll Environ used in-line lightning NO_x emissions derived from the convective precipitation rate provided in the MCIP files. Since the CMAQ model includes inline calculation of lightening NO_x emissions, no pre-processing of lightening NOx is needed. The CAMx model requires pre-calculated lightening emissions for input. To better facilitate comparisons with CMAQ, lightening NO_x emissions from the CMAQ modeling were output and converted into a format suitable for use in CAMx.

H.3.9.6 Windblown Dust

Windblown dust emissions are calculated in-line in the CMAQ model based on wind speed and soil moisture parameters passed to CMAQ from the WRF model. Spatially and temporally resolved CMAQ windblown dust emissions were output for use in CAMx.

H.3.9.7 QA/QC of Processed Emissions

Emissions were processed by major source category in several different processing “streams” to simplify the emissions modeling process and facilitate the QA/QC of results. SMOKE includes QA and reporting features to keep track of the adjustments at each step of emissions processing and to ensure that data integrity is not compromised. Ramboll Environ carefully reviewed the SMOKE log files for significant error messages and ensure that appropriate source profiles are being used. In addition, SMOKE output summary reports were reviewed and compared with input emission totals.

H.3.9.8 Development of Model-Ready Emissions

Since the "Air Quality Modeling in the Gulf of Mexico Region" study involved application of both the CAMx and CMAQ photochemical grid models, the emissions processing procedure included development of emissions ready for input to CMAQ, as well as for input to CAMx. Each SMOKE processing stream generates a set of pre-merged model-ready emissions in CMAQ input format (netCDF). As specified in the chemical speciation section, species mapping was applied to convert SMOKE generated model species to the appropriate input for CMAQ. SMOKE modeling generated VOC model species for CB6 chemical mechanism, which were converted into CB05 model species for CMAQ. All pre-merged gridded emissions inputs were merged together to generate the final CMAQ-ready, two-dimensional gridded low-level (layer 1) and point source emissions inputs. Since CMAQ provides the option to specify point source emissions separately from the gridded emissions from other sources, only distributed sources (mobile sources, area sources, natural emissions) were merged in developing the CMAQ-ready emissions files.

The CAMx requires two types of emissions files, as described below, for every episode day; both of the emission files are UAM-based Fortran binary files.

(1) Surface-level 2D emissions: This file contains two-dimensional gridded fields of low-level (i.e. surface) emissions rates for all emitted species to be modeled.

(2) Elevated point source emissions: The elevated point source emissions file contains stack parameters and emissions rates for all elevated point sources and emitted species to be modeled.

The merged two-dimensional gridded anthropogenic emissions, which were originally output in CMAQ format, were converted into CAMx format using the CMAQ2CAMX program[7]. Ramboll Environ then merged natural source categories – sea salt, biogenic, fires, lightning and windblown dust with the surface-level emissions using the MRGUAM processor to develop CAMx model-ready emissions. Ramboll Environ first converted model species from CMAQ to CAMx compatible form and then converted CMAQ 2-D and in-line point emissions files to CAMx area-/point-source emissions files using the CMAQ2CAMx interface program. The point source emissions files in UAM-based binary format were merged together to develop the final CAMx-ready point-source emissions. The elevated point source file is independent of the modeling grid because it contains horizontal (X, Y) coordinates for each point source, and so one file includes all point sources in the 12- and 4-km BOEM modeling grids. In addition, CAMx requires separate emissions inputs for source groups being tracked in the source apportionment modeling performed for the future year scenario.

[7] http://www.camx.com/download/support-software.aspx

H.3.9.9 Summary of Processed Emissions

This section presents 2012 base case and future year scenario emissions summaries for the BOEM 12- and 4-km domains. The summary is organized by state and by source category.

Table H-4 summarizes NO_x, VOC, SO_2, and $PM_{2.5}$ air pollutant emissions in short tons per year for the states that border the Gulf of Mexico (i.e., Texas, Louisiana, Alabama, Mississippi, and Florida). The summary data are based on 12-km SMOKE processing of 2012 base case and future year inventories as described above. With the exception of fugitive dust and biogenic sources, emissions are summarized from the SMOKE reports generated by the SMKMRG program. Fugitive dust emissions were adjusted after SMOKE processing to account for fugitive dust correction factors derived from the Biogenic Emission Landuse Database version 3 (BELD3). Application of these dust transport correction factors accounts for suppression of grid-scale dust emissions via deposition on proximate vegetation surfaces such as roadside trees and bushes. As noted above, biogenic emissions were generated using the MEGAN model outside of SMOKE and so are generated directly on the 36/12/4-km grids rather than by state/county. Across the 5-state region, NO_x emissions were projected to go down 4% but VOC emissions are expected to increase by 3%, with $PM_{2.5}$ emissions increasing by 10%. The largest change in emissions between the current and future year is for SO_2 that is projected to go down by 39%.

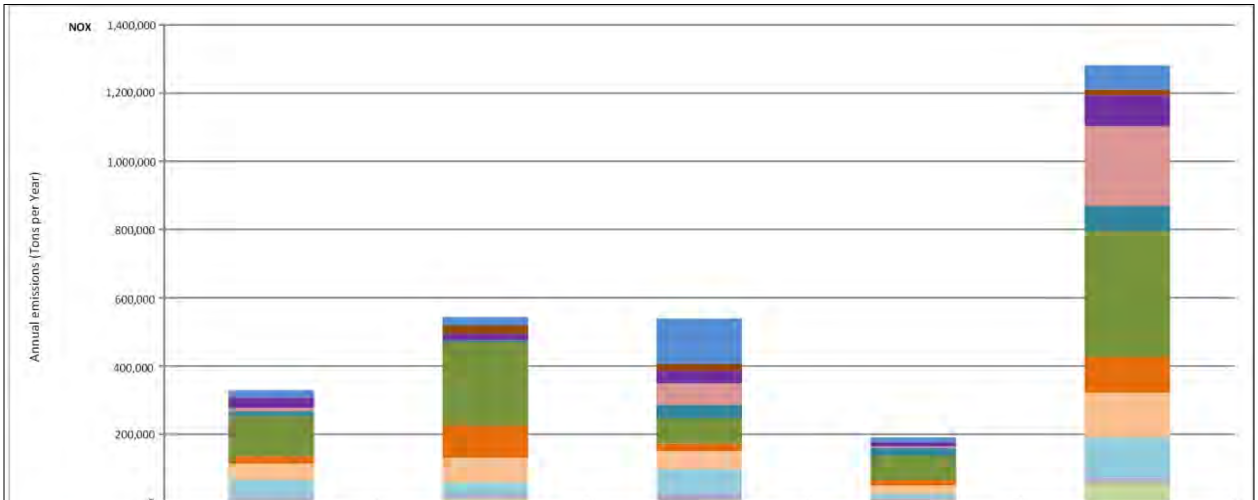
Table H-4. 2012 Base Case and Future Year Emissions Summary by State for BOEM'S 12-km Domain (only Gulf Coast States: Alabama, Florida, Louisiana, Mississippi, and Texas).

States	2012 Base Year				Future Year Scenario			
	NO_x (TPY)	$PM_{2.5}$ (TPY)	SO_2 (TPY)	VOC (TPY)	NO_X (TPY)	$PM_{2.5}$ (TPY)	SO_2 (TPY)	VOC (TPY)
Alabama	210,701	183,321	201,810	1,763,216	178,015	208,531	104,688	1,744,057
Florida	299,738	182,492	144,640	1,754,031	263,778	201,117	127,170	1,690,680
Louisiana	464,962	299,510	203,154	2,030,042	406,421	301,052	127,260	2,007,720
Mississippi	119,430	216,950	57,466	1,622,369	98,334	277,025	32,403	1,610,893
Texas	911,470	683,209	451,018	5,155,944	970,493	739,791	257,073	5,588,049

Figure H-6 throughFigure H-9 present stacked bar chart summaries for the 2012 base case emissions that show BOEM 12-km domain anthropogenic, fire, and biogenic emissions by source category and pollutants for Alabama, Florida, Louisiana, Mississippi, and Texas. Note that these emission summaries are only for the states (and State waters) that border the Gulf of Mexico. Similarly, **Figure H-10 throughFigure** H-13 present stacked bar chart summaries for the future year scenario in short tons per year for the Gulf Coast States. Emission categories used in these summaries are defined below:

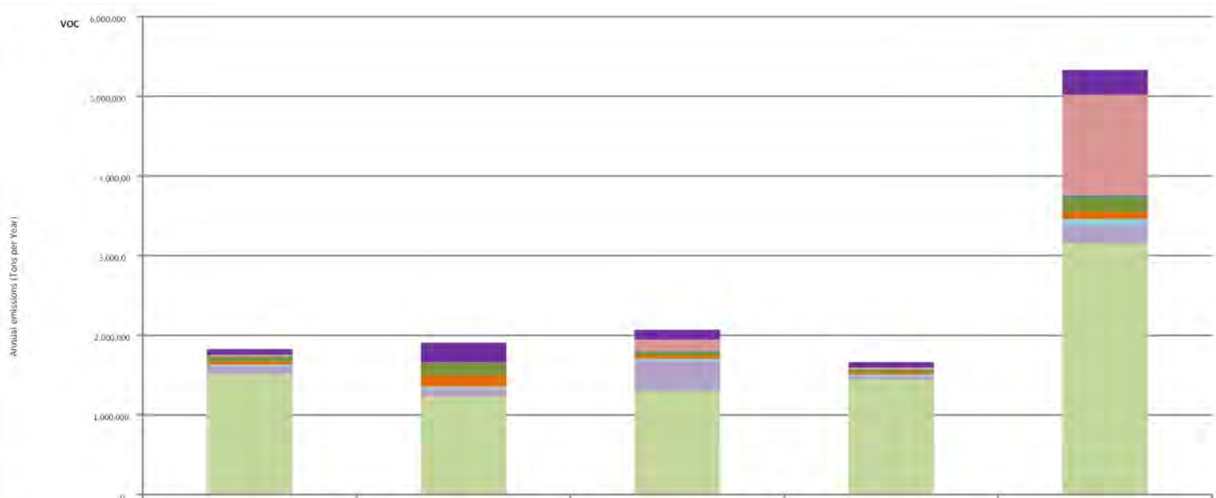
Source Category	Description
ALM	Aircraft, locomotive and smaller commercial marine vessels
Fugitive Dust	Anthropogenic fugitive dust from paved and unpaved roads, agricultural, construction, and mining sources
C3 CMV	Commercial marine vessels with Category 3 (C3) main engines

Source Category	Description
Nonpoint	Stationary non-point sources
Area Oil and Gas	Non-point oil and gas sector onshore sources
Point Oil and Gas	Point oil and gas sector onshore sources
Onroad	Motorized vehicles that are normally operated on public roadways (passenger cars, motorcycles, minivans, sport-utility vehicles, light-duty trucks, heavy-duty trucks, and buses
Nonroad	Off-road equipment included in USEPA's nonroad model
EGU Point	Electric Generating Unit point sources
NonEGU Point	NEI point sources that are not in the EGU or Point oil and gas sectors
Fires	Agricultural fires, wildfires and prescribed burning
Biogenic	Vegetation and soils throughout domain
BOEM OCS Support Vessel with Action (State waters only)	All BOEM OCS oil and gas support vessels and helicopter under the 2017-2022 GOM Multisale EIS's "Proposed Action" scenario



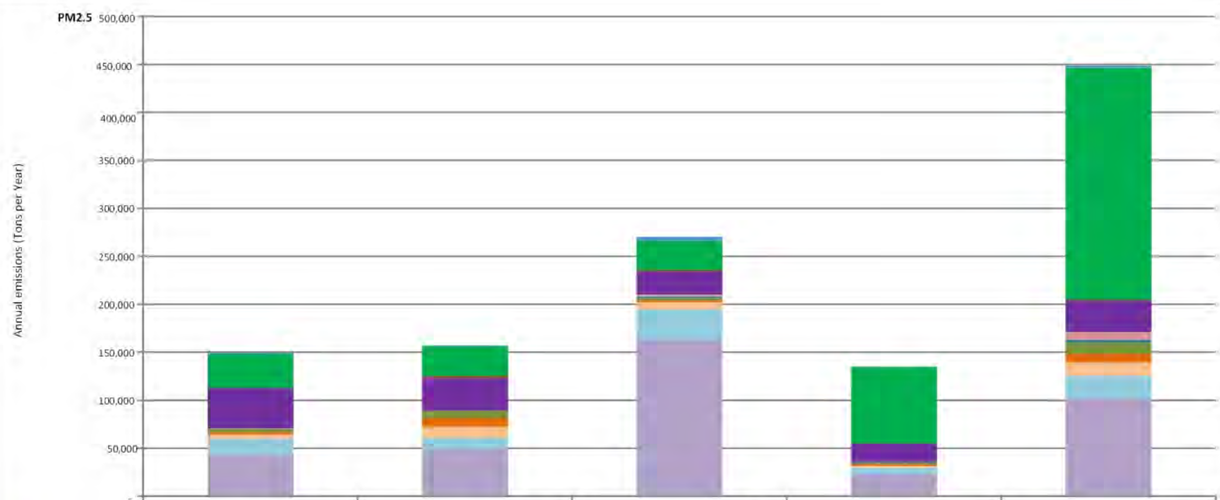
	Alabama	Florida	Louisiana	Mississippi	Texas
ALM	22,187	24,680	132,587	14,043	70,977
Fugitive Dust	-	-	-	-	-
C3 CMV	971	24,823	20,265	1,067	15,637
Nonpoint	29,583	19,810	37,279	12,713	91,593
Area O&G	10,207	75	63,115	3,126	234,192
Point O&G	13,338	5,303	39,071	23,337	73,067
Onroad	118,611	243,612	73,345	70,922	369,305
Nonroad	21,563	94,187	22,506	16,326	104,704
EGU Point	47,247	72,708	52,585	23,088	131,820
NonEGU Point	49,997	35,207	73,726	13,257	117,052
Fires	10,105	12,139	17,307	6,294	14,474
Biogenic	5,503	10,804	6,521	6,178	57,955

Figure H-6. BOEM's 12-km 2012 Base Case NO_x Emissions Summary in Tons per Year by Source Category and State (Alabama, Florida, Louisiana, Mississippi, and Texas).



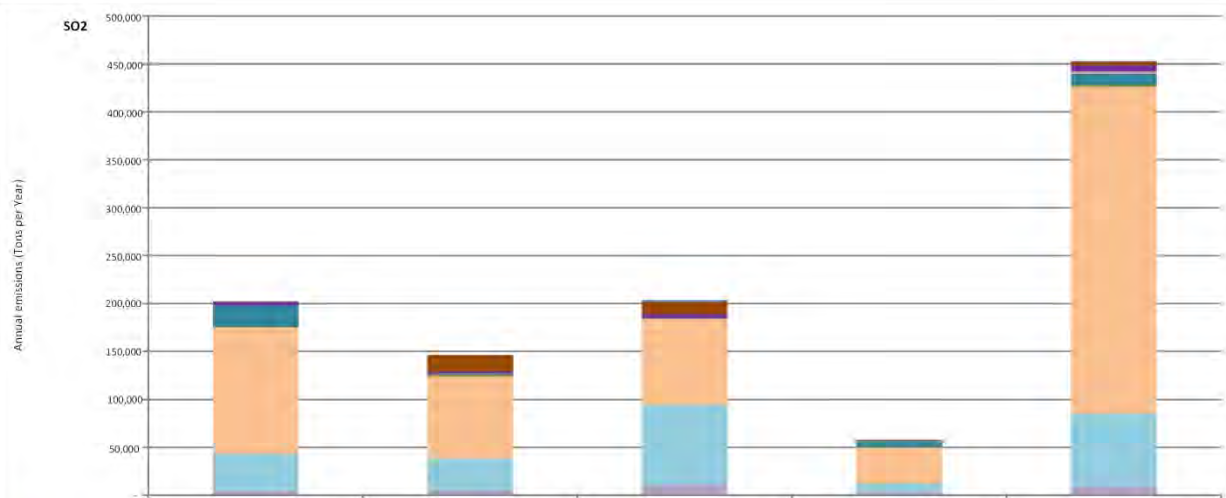
	Alabama	Florida	Louisiana	Mississippi	Texas
ALM	943	774	3,319	514	3,605
Fugitive Dust	-	-	-	-	-
C3 CMV	36	833	737	37	628
Nonpoint	66,912	248,371	119,530	65,800	309,395
Area O&G	22,960	2,726	147,466	21,091	1,268,897
Point O&G	1,866	558	11,263	3,366	22,395
Onroad	60,863	152,419	39,325	37,769	176,615
Nonroad	39,070	146,351	43,583	27,100	89,663
EGU Point	1,293	3,649	1,377	572	3,410
NonEGU Point	25,570	21,884	38,954	23,034	80,784
Fires	88,593	97,281	360,560	40,655	220,751
Biogenic	1,515,975	1,231,604	1,303,252	1,440,201	3,156,416

Figure H-7. BOEM 12-km 2012 Base Case VOC Emissions Summary in Tons per Year by Source Category and State (Alabama, Florida, Louisiana, Mississippi, and Texas).



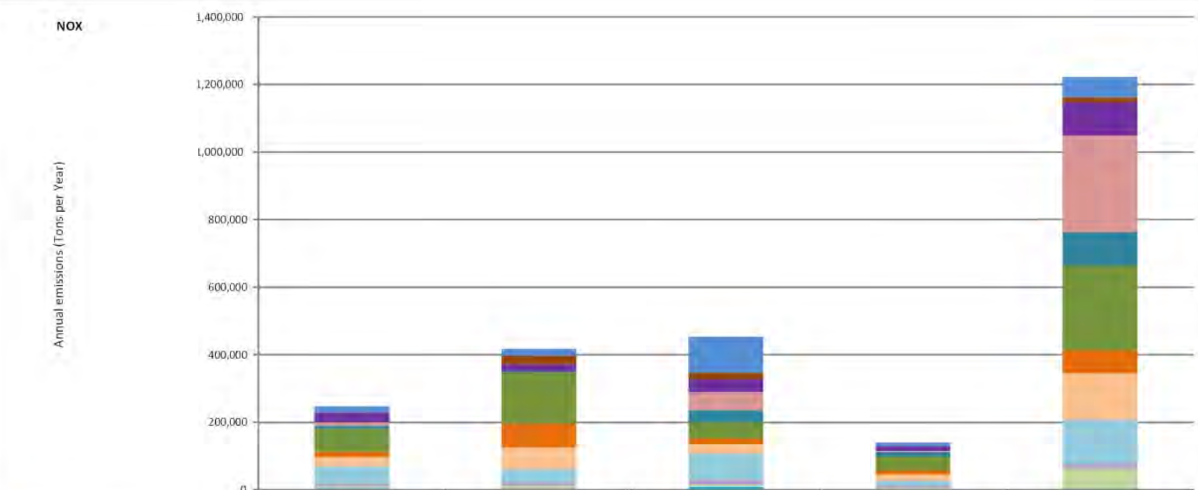
	Alabama	Florida	Louisiana	Mississippi	Texas
ALM	700	766	4,222	430	2,054
Fugitive Dust	35,334	31,200	30,530	79,263	241,756
C3 CMV	74	2,027	1,534	82	497
Nonpoint	42,167	33,881	23,829	19,757	33,391
Area O&G	260	2	1,982	88	7,855
Point O&G	338	108	1,715	364	2,931
Onroad	3,637	7,729	2,345	2,014	11,615
Nonroad	2,223	9,141	2,181	1,626	9,119
EGU Point	4,133	11,413	7,244	1,692	13,886
NonEGU Point	16,674	11,908	32,024	7,296	23,346
Fires	43,385	48,951	162,728	22,455	102,046
Biogenic	-	-	-	-	-

Figure H-8. BOEM 12-km 2012 Base Case $PM_{2.5}$ Emissions Summary in Tons per Year by Source Category and State (Alabama, Florida, Louisiana, Mississippi, and Texas).



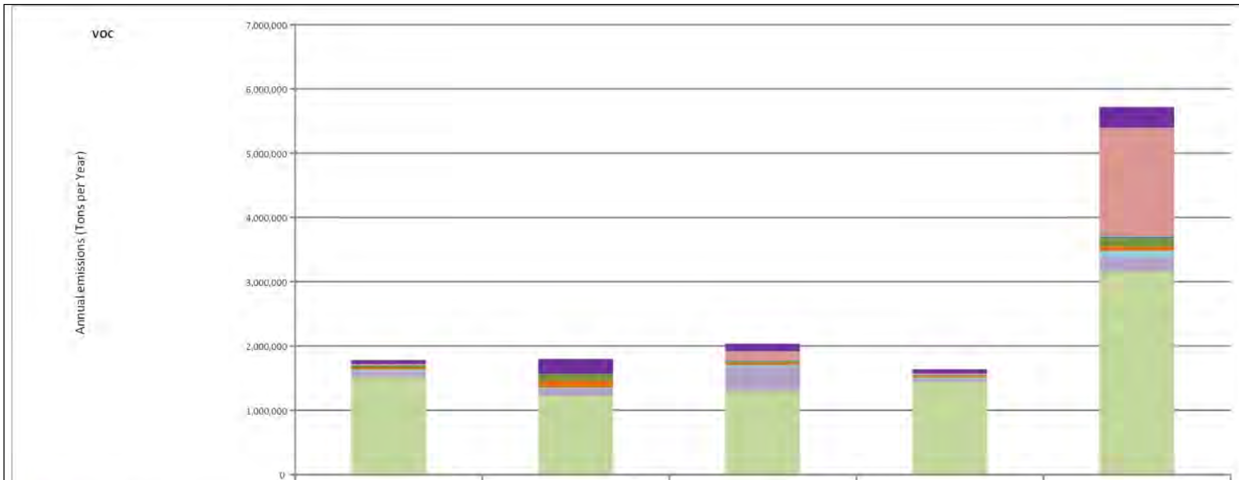
	Alabama	Florida	Louisiana	Mississippi	Texas
ALM	242	280	1,603	153	713
Fugitive Dust	-	-	-	-	-
C3 CMV	635	17,141	13,061	740	4,404
Nonpoint	3,643	2,388	4,302	894	6,240
Area O&G	46	2	173	31	2,304
Point O&G	21,967	943	488	5,825	11,304
Onroad	592	1,842	441	352	2,259
Nonroad	47	194	47	32	188
EGU Point	131,903	85,483	89,045	37,279	340,995
NonEGU Point	38,663	32,528	83,318	9,544	76,365
Fires	4,664	5,680	11,117	2,968	8,505
Biogenic	-	-	-	-	-

Figure H-9. BOEM 12-km 2012 Base Case SO_2 Emissions Summary in Tons per Year by Source Category and State (Alabama, Florida, Louisiana, Mississippi, and Texas).



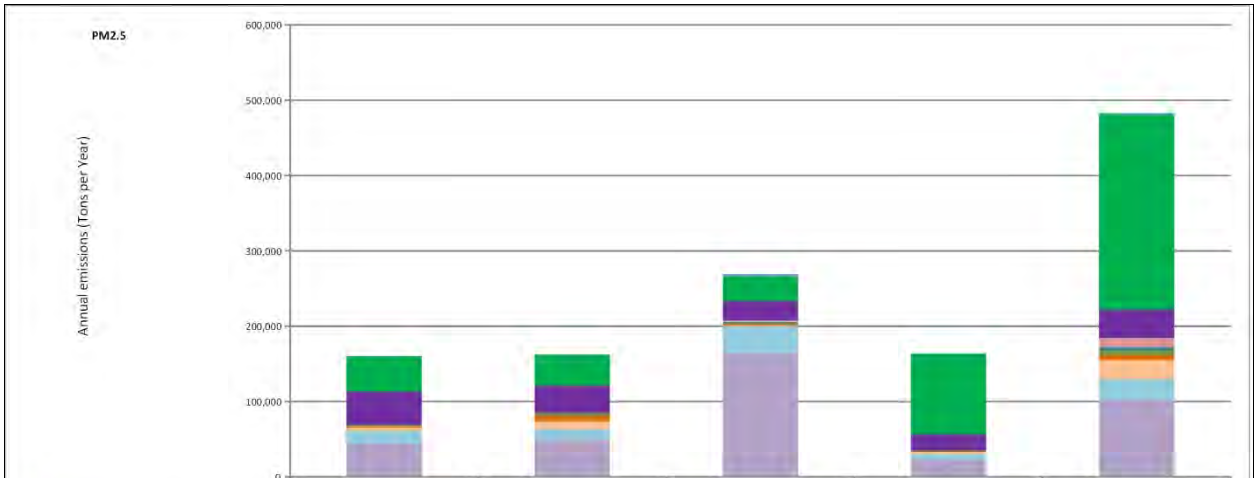
	Alabama	Florida	Louisiana	Mississippi	Texas
ALM	18,589	20,338	106,694	11,650	60,228
Fugitive Dust	-	-	-	-	-
C3 CMV	919	25,472	19,184	1,010	14,803
Nonpoint	28,479	20,023	38,619	13,162	98,650
Area O&G	9,791	54	52,941	2,460	286,144
Point O&G	7,941	2,619	36,784	13,217	98,642
Onroad	69,174	153,294	47,154	42,091	251,443
Nonroad	15,534	69,617	16,923	11,908	68,038
EGU Point	27,727	64,970	27,347	17,909	135,803
NonEGU Point	49,478	37,742	75,646	14,545	131,876
Fires	10,105	12,139	17,307	6,294	14,474
Biogenic	5,503	10,804	6,521	6,178	57,955
BOEM OCS Sup. Vessel w/Action	3,949	0	8,454	0	3,881

Figure H-10. BOEM 12-km Future Year NO_x Emissions Summary in Tons per Year by Source Category and State (Alabama, Florida, Louisiana, Mississippi, and Texas).



	Alabama	Florida	Louisiana	Mississippi	Texas
ALM	661	587	2,630	369	2,475
Fugitive Dust	-	-	-	-	-
C3 CMV	43	1,071	874	44	746
Nonpoint	62,324	227,349	113,678	61,502	319,263
Area O&G	20,611	2,264	143,332	21,786	1,691,300
Point O&G	1,394	435	11,250	3,475	27,984
Onroad	35,193	107,225	26,348	22,906	128,671
Nonroad	27,959	103,374	30,468	19,306	63,715
EGU Point	1,043	2,313	850	574	5,106
NonEGU Point	25,286	24,403	39,403	22,982	100,121
Fires	88,593	97,281	360,560	40,655	220,751
Biogenic	1,515,975	1,231,604	1,303,252	1,440,201	3,156,416
BOEM OCS Sup. Vessel w/Action	169	0	1,421	0	171

Figure H-11. BOEM 12-km Future Year VOC Emissions Summary in Tons per Year by Source Category and State (Alabama, Florida, Louisiana, Mississippi, and Texas).



	Alabama	Florida	Louisiana	Mississippi	Texas
ALM	508	555	3,011	311	1,501
Fugitive Dust	46,649	40,813	32,621	107,592	259,416
C3 CMV	13	386	271	14	88
Nonpoint	43,916	35,751	25,230	20,839	37,578
Area O&G	215	2	1,868	76	12,271
Point O&G	304	66	1,767	240	3,744
Onroad	2,001	4,592	1,395	1,170	7,128
Nonroad	1,618	6,841	1,544	1,140	6,155
EGU Point	4,613	10,062	1,395	2,097	25,048
NonEGU Point	16,623	14,396	36,271	7,899	27,414
Fires	43,385	48,951	162,728	22,455	102,046
Biogenic	-	-	-	-	-
BOEM OCS Sup. Vessel w/Action	360	0	777	0	354

Figure H-12. BOEM 12-km Future Year $PM_{2.5}$ Emissions Summary in Tons per Year by Source Category and State (Alabama, Florida, Louisiana, Mississippi, and Texas).

	Alabama	Florida	Louisiana	Mississippi	Texas
ALM	18	34	240	15	34
Fugitive Dust	-	-	-	-	-
C3 CMV	29	846	595	34	201
Nonpoint	2,004	1,510	1,492	873	2,924
Area O&G	23	2	214	37	5,125
Point O&G	20,298	853	576	5,513	11,291
Onroad	301	933	235	182	1,223
Nonroad	25	94	24	17	92
EGU Point	40,732	86,015	29,990	13,422	155,982
NonEGU Point	36,887	32,135	82,976	9,525	72,910
Fires	4,664	5,680	11,117	2,968	8,505
Biogenic	-	-	-	-	-
BOEM OCS Sup. Vessel w/Action	8	0	36	0	10

Figure H-13. BOEM 12-km Future Year SO_2 Emissions Summary in Tons per Year by Source Category and State (Alabama, Florida, Louisiana, Mississippi, and Texas).

Table H-5 summarizes NO_x, VOC, SO_2, and $PM_{2.5}$ emissions within the 4-km domain in short tons for the 2012 base year and the 2017 future year scenario, and **Table H-6** summarizes the changes in emissions between the base and future year scenarios by major source category.

Table H-5. 2012 Base Case and Future Year Emissions Summary by Source Category for BOEM's 4-km Domain.

Sectors	2012 Base Year (TPY)				Future Year Scenario (TPY)			
	NO_x	$PM_{2.5}$	SO_2	VOC	NO_x	$PM_{2.5}$	SO_2	VOC
Fugitive Dust	0	70,526	0	0	0	78,179	0	0
Agricultural	0	0	0	0	0	0	0	0
Fires	50,781	493,750	34,939	1,112,486	50,781	493,750	34,939	1,112,486
ALM	171,436	5,416	2,039	4,896	278,052	7,752	560	7,520
C3 CMV	68,857	3,650	36,339	2,466	108,654	2,666	25,892	4,769
Biogenic	19,015	0	0	3,140,424	19,015	0	0	3,140,424
Nonpoint	81,918	54,561	7,390	296,267	86,014	58,937	3,165	294,728
Nonroad	76,345	6,994	153	112,683	105,272	9,653	159	157,559
Area Oil and Gas	69,331	1,991	530	506,972	148,131	5,535	2,134	1,283,385
Onroad	270,364	8,467	1,731	145,061	183,305	7,124	940	106,904

Sectors	2012 Base Year (TPY)				Future Year Scenario (TPY)			
	NO_x	$PM_{2.5}$	SO_2	VOC	NO_x	$PM_{2.5}$	SO_2	VOC
Non-U.S. Fugitive Dust	0	0	0	0	0	0	0	0
Non-U.S. Area	38,832	4,361	719	15,208	35,625	4,429	502	16,787
BOEM Gulfwide	186,636	6,337	26,968	7,310	129,814	4,117	31,839	36,109
Non-U.S. Onroad	13,894	438	73	6,217	9,097	447	27	4,041
Non-U.S. Point (with GOM offshore platforms)	106,344	2,663	7,795	57,361	32,045	2,181	4,646	11,337
Point Oil and Gas	101,530	4,587	50,861	39,192	95,052	4,961	47,086	42,884
EGU Point	137,932	17,943	306,031	3,545	117,518	21,802	136,784	4,371
Non-EGU Point	319,924	105,264	271,961	208,773	344,080	120,826	269,191	240,212
BOEM OCS Platform No Action	0	0	0	0	84,351	837	3,205	54,449
BOEM OCS Platform w/Action	0	0	0	0	22,973	223	1,037	7,015
BOEM OCS Support Vessel No Action	0	0	0	0	234,796	8,296	23,089	8,093
BOEM OCS Support Vessel w/Action	0	0	0	0	106,163	9,749	396	10,238

Table H-6. Changes in Emissions between the 2012 Base Case and Future Year Emissions (short tons per year) by Source Category for BOEM's 4-km Domain.

Sector	Future Year - Base Year (TPY)				Future Year - Base Year (%)			
	NO_x	$PM_{2.5}$	SO_2	VOC	NO_x	$PM_{2.5}$	SO_2	VOC
Fugitive Dust	0	7,653	0	0	--	11%	--	--
Agricultural	0	0	0	0	--	--	--	--
Fires	0	0	0	0	0%	0%	0%	0%
ALM	106,616	2,336	(1,479)	2,624	62%	43%	-73%	54%
C3 CMV	39,797	(984)	(10,447)	2,303	58%	-27%	-29%	93%
Biogenic	0	0	0	0	0%	--	--	0%
Nonpoint	4,096	4,376	(4,225)	(1,539)	5%	8%	-57%	-1%
Nonroad	28,927	2,659	6	44,876	38%	38%	4%	40%
Area Oil and Gas	78,800	3,544	1,604	776,413	114%	178%	303%	153%
Onroad	(87,059)	(1,343)	(791)	(38,157)	-32%	-16%	-46%	-26%

Sector	Future Year - Base Year (TPY)				Future Year - Base Year (%)			
	NO_x	$PM_{2.5}$	SO_2	VOC	NO_x	$PM_{2.5}$	SO_2	VOC
Non-U.S. Fugitive Dust	0	0	0	0	--	--	--	--
Non-U.S. Area	(3,207)	68	(217)	1,579	-8%	2%	-30%	10%
BOEM Gulfwide	(56,822)	(2,220)	4,871	28,799	-30%	-35%	18%	394%
Non-U.S. Onroad	(4,797)	9	(46)	(2,176)	-35%	2%	-63%	-35%
Non-U.S. Point (with GOM offshore platforms)	(74,299)	(482)	(3,149)	(46,024)	-70%	-18%	-40%	-80%
Point Oil and Gas	(6,478)	374	(3,775)	3,692	-6%	8%	-7%	9%
EGU Point	(20,414)	3,859	(169,247)	826	-15%	22%	-55%	23%
Non-EGU Point	24,156	15,562	(2,770)	31,439	8%	15%	-1%	15%

Figure H-14 presents spatial plots of future year scenario NO_x, VOC, $PM_{2.5}$, and SO_2 emissions in short tons per year within the 4-km domain for BOEM's BOEM OCS oil and gas production platforms under the 2017-2022 GOM Multisale EIS. Note that the deepwater platforms have higher annual emissions than the shallow-water platforms. **Figure H-15** presents 4-km spatial plots for the same pollutants and future year scenario in short tons per year for BOEM's OCS oil and gas support vessels and helicopters under the 2017-2022 GOM Multisale EIS. **Figure H-16** shows emissions for BOEM's OCS oil and gas platforms, support vessels, and helicopters under the No Action alternative, which are the existing sources. **Figure H-17** shows emissions for all other marine vessel activity in the Gulf of Mexico. **Figure H-18** shows emissions for all other anthropogenic US sources.

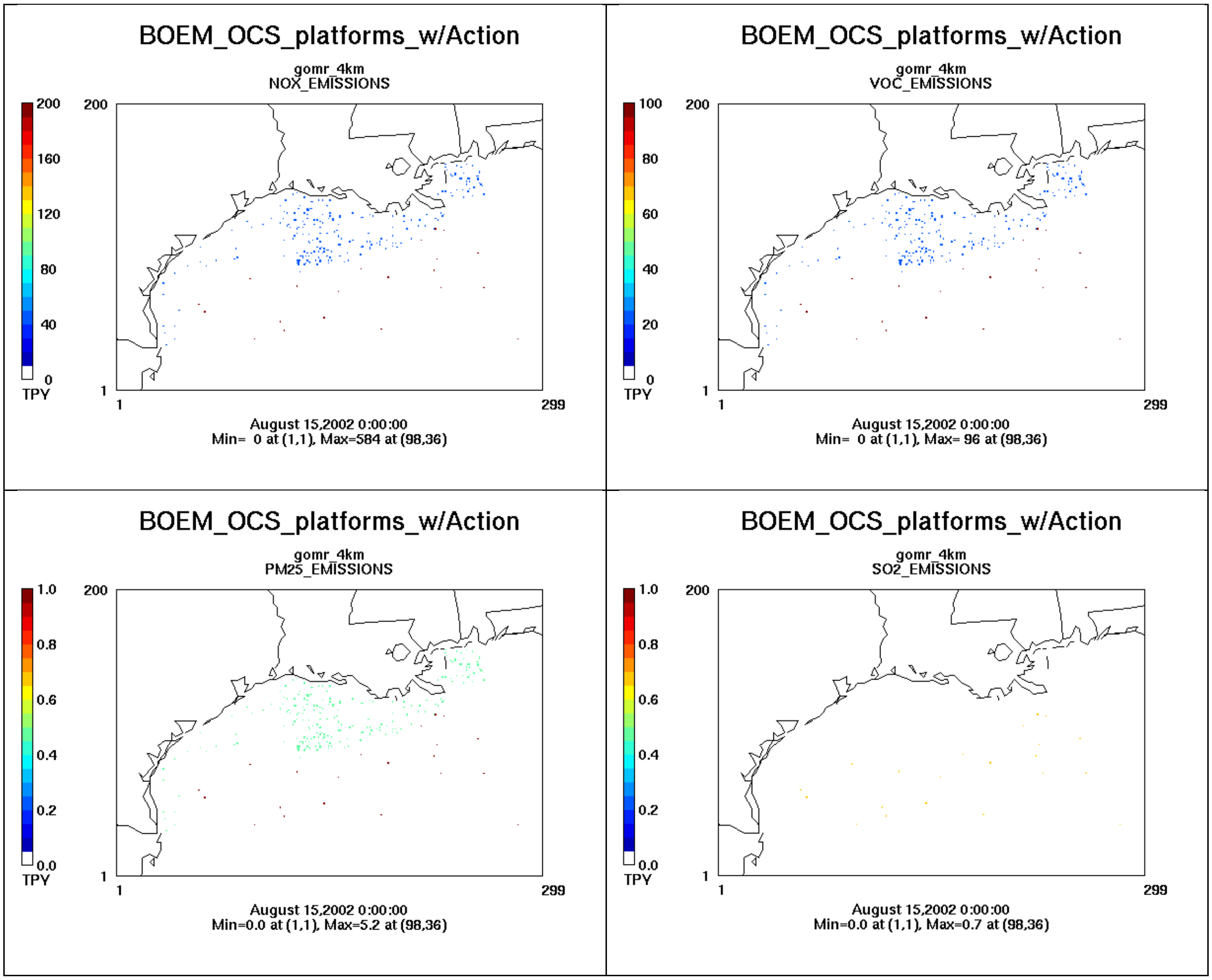


Figure H-14. Spatial Distribution of (clockwise starting from top left) NO_x, VOC, SO_2, and $PM_{2.5}$ Emissions (tons per year) from New OCS Oil and Gas Production Platforms under the Proposed Action.

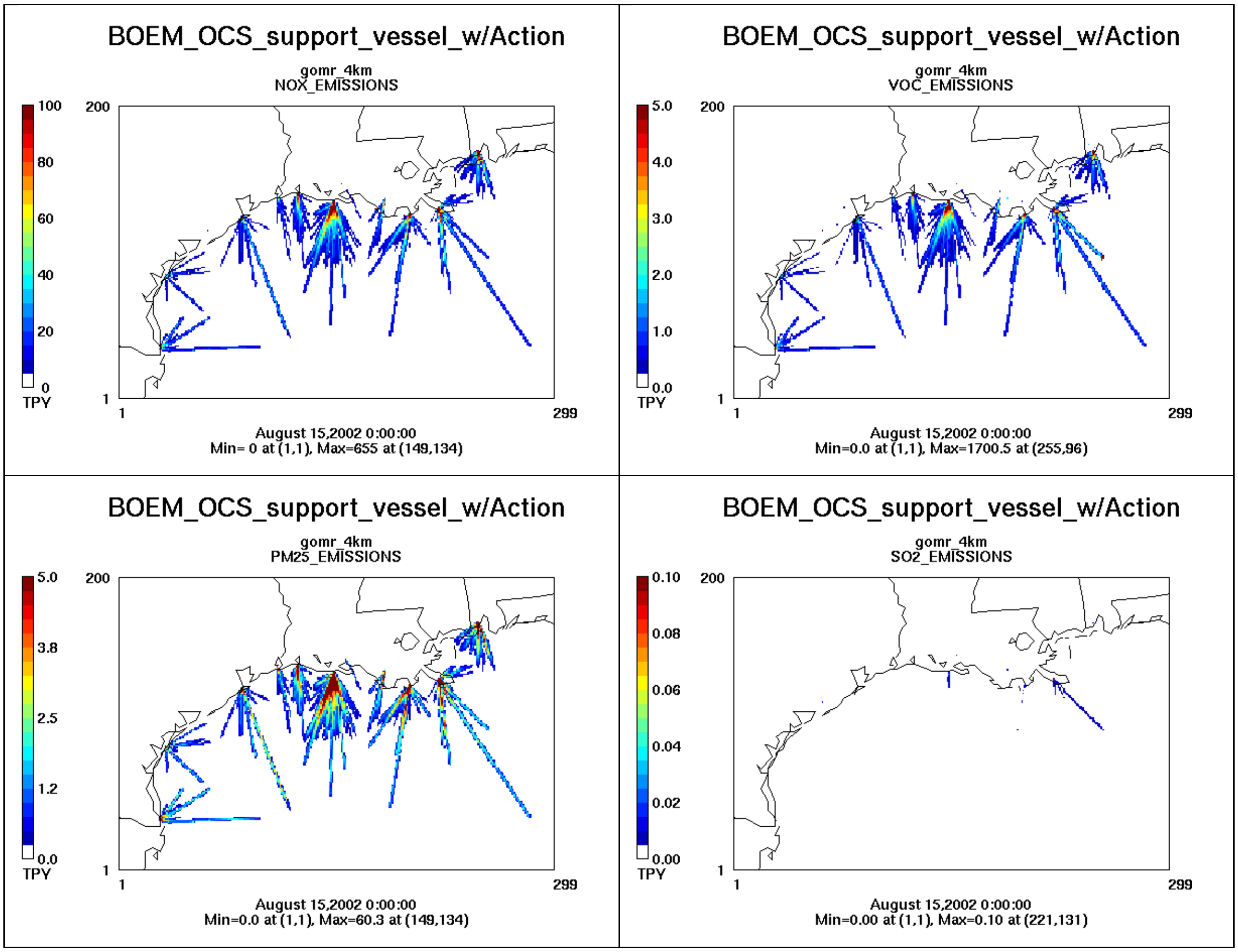


Figure H-15. Spatial Distribution of Emissions (tons per year) of (clockwise starting from top left) NO_x, VOC, SO_2, and $PM_{2.5}$ from BOEM's OCS Additional Oil and Gas Support Vessels and Helicopters under the Proposed Action Scenario.

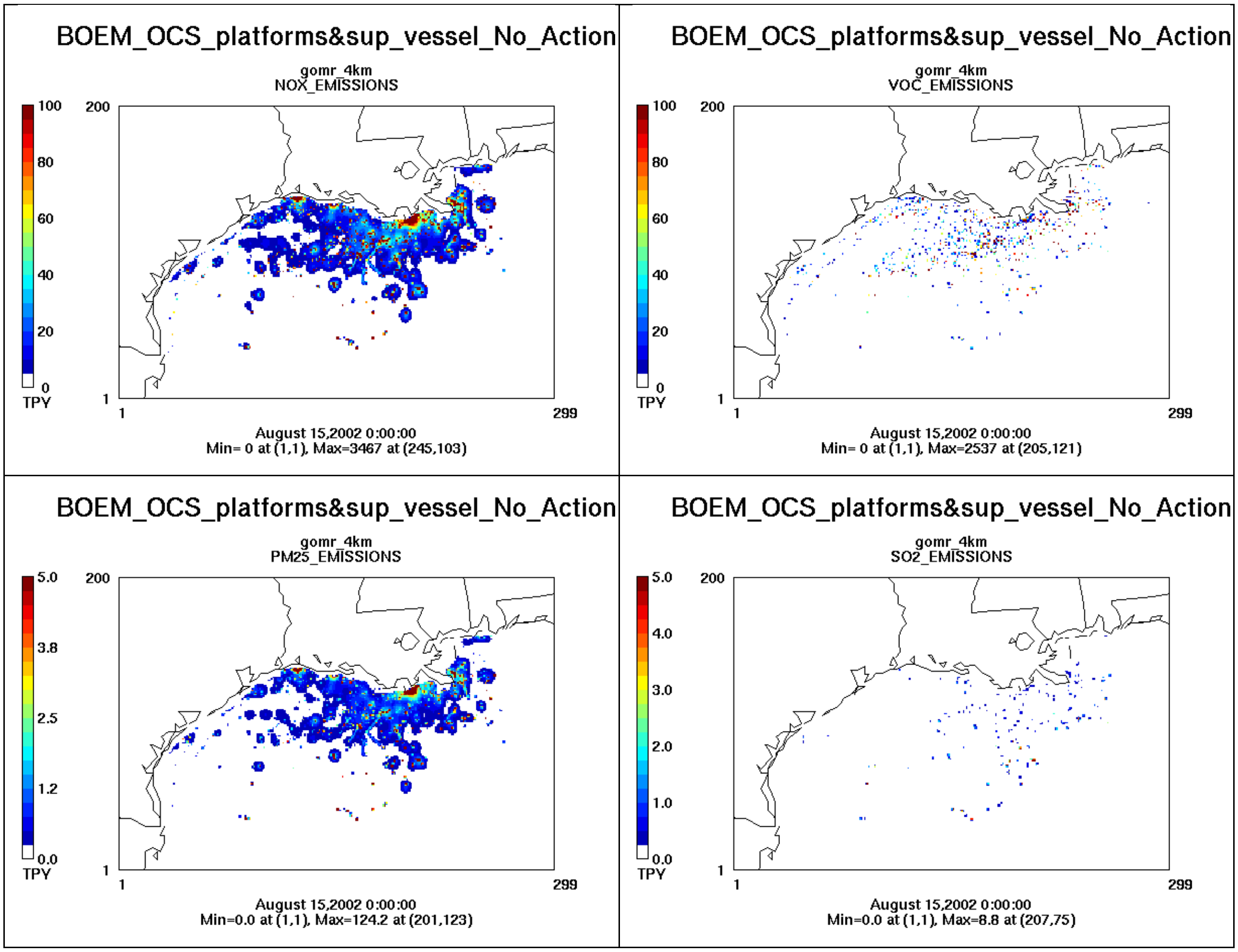


Figure H-16. Spatial Distribution of (clockwise starting from top left) NO_x, VOC, SO_2, and $PM_{2.5}$ Emissions (tons per year) from BOEM's OCS Oil and Gas Platforms, Support Vessels, and Helicopters under the No Action Alternative in BOEM's 4-km Domain.

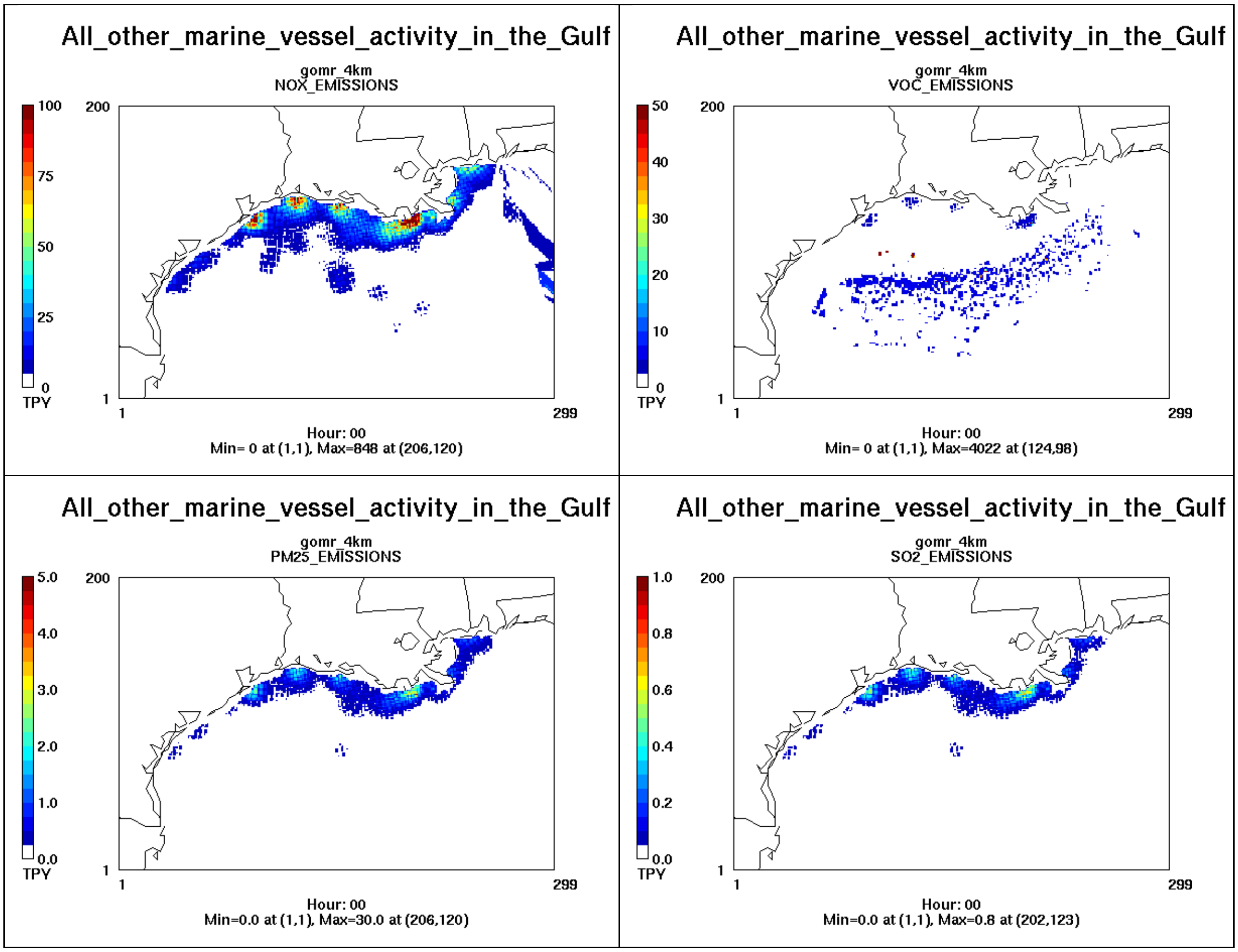


Figure H-17. Spatial Distribution of (clockwise starting from top left) NO_x, VOC, SO_2, and $PM_{2.5}$ Emissions (tons per year) from All Other Marine Vessel Activity in the Gulf of Mexico under the Future Year Scenario in BOEM's 4-km Domain.

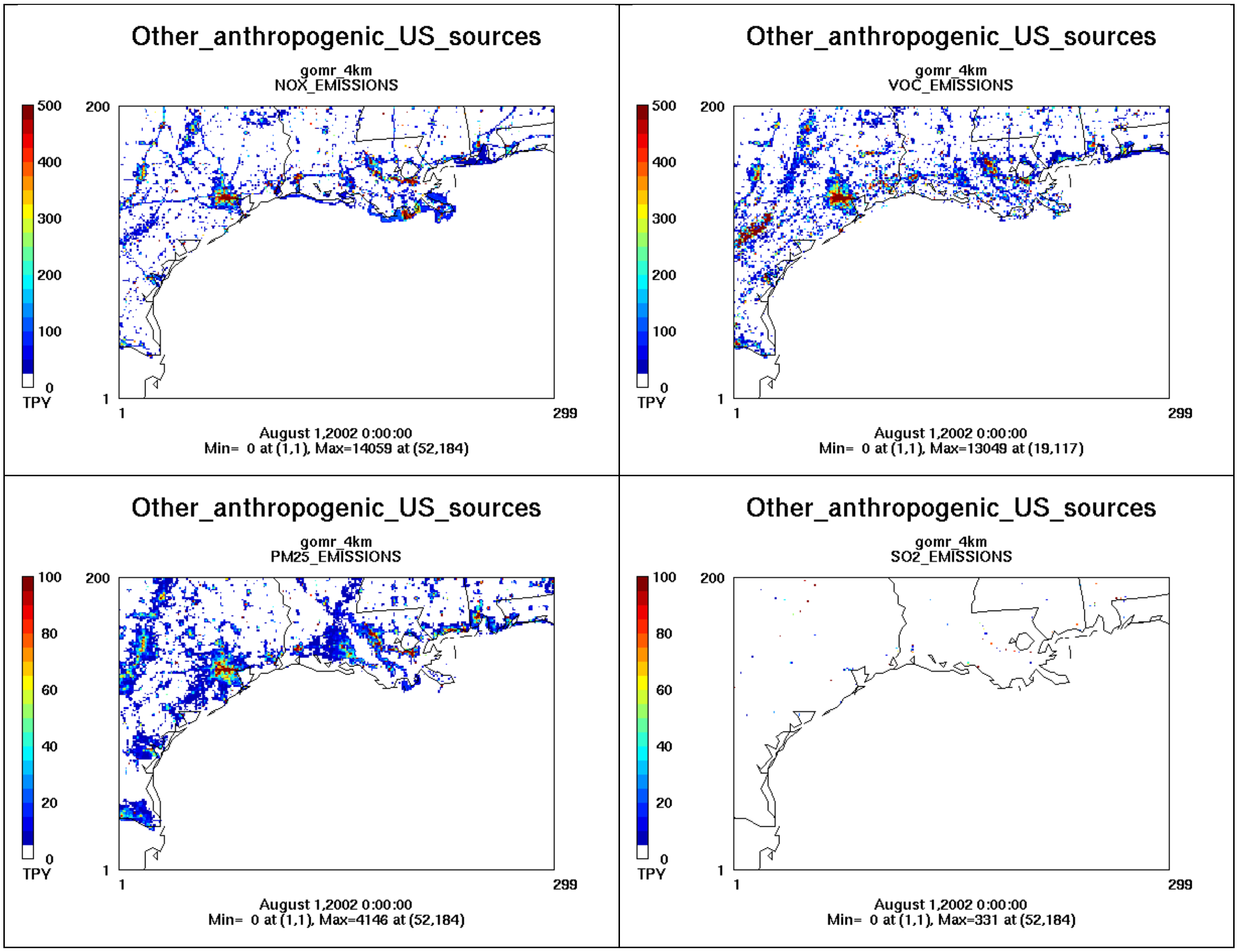


Figure H-18. Spatial Distribution of (clockwise starting from top left) NO_x, VOC, SO_2, and $PM_{2.5}$ Emissions (tons per year) from Other Anthropogenic U.S. Sources for the Future Year Scenario within BOEM's 4-km Domain.

H.3.10 Source Apportionment Design

Source apportionment, as applied in CAMx, provides a means of assessing the contributions of specified sources or categories of sources to predicted ozone and PM concentrations under the air quality conditions being simulated. Source contributions can be calculated for ozone and for PM using ozone or PM source apportionment routines included in CAMx. Source apportionment analyses were applied to the future year scenario in order to analyze the pre- and postlease OCS oil and gas impacts to short-term and annual NAAQS, AQRVs, and PSD increments. BOEM selected a set of nine source categories for source apportionment as listed in **Table H-7**.

Table H-7. Source Categories for Source Apportionment Calculations.

Category ID	Sources
SC1	Fires (U.S., Canada, and Mexico)
SC2	Biogenic and other natural sources (e.g., lighting NO_x and sea salt)
SC3	Additional BOEM OCS oil and gas production platforms associated with the 2017-2022 GOM Multisale EIS scenario (w/Action)
SC4	Additional BOEM oil and gas production support vessels and helicopters associated with the 2017-2022 GOM Multisale EIS scenario (w/Action)
SC5	BOEM's OCS oil and gas production platforms, support vessels, and helicopters under the base case (No Action) alternative
SC6	All other marine vessel activity in the Gulf of Mexico, not associated with OCS oil and gas activities
SC7	Other anthropogenic U.S. sources[8]
SC8	Mexican and Canadian anthropogenic sources[9]
SC9	Initial Conditions (IC)
SC10	Boundary Conditions (BC)

These source categories aggregate similar sources based on jurisdiction (i.e., sources under BOEM's jurisdiction versus other Federal agencies) and sources beyond direct domestic regulatory control (e.g., natural emission sources and foreign sources). Additional OCS oil and gas production platforms and additional support vessel and helicopter trips associated with the 2017-2022 GOM Multisale EIS are included as a separate source category, thus providing estimates of the impacts of these new sources, which are projected to occur under the future year scenario associated with the 2017-2022 GOM Multisale EIS. Platforms and support vessels and helicopters projected for the future year scenario under the base case (No Action) scenario are also included as a separate source apportionment category.

Isolating fires and biogenic emissions shows the component of the air quality concentrations that are typically beyond the control of Federal agencies and states. Similarly, the Mexican and Canadian anthropogenic emissions are beyond the control of U.S. regulators.

H.4 BASE CASE PHOTOCHEMICAL GRID MODELING

H.4.1 Overview

The CAMx Photochemical Grid Model (PGM) was applied on a set of nested domains with horizontal resolutions of 36, 12 and 4 km centered on the Gulf of Mexico OCS Region (**Figure H-5**). For the 2012 base case analysis, CAMx was run with the 2012 base case emissions described in **Section H.3**. Meteorological fields required by CAMx were obtained from the WRF meteorological model results for 2012, which were developed as described in **Section H.2**. Modeling procedures

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[8] Includes onshore oil and gas production sources and oil and gas production sources in State waters.
[9] Also includes oil and gas production sources.

were based on the USEPA's current and revised draft modeling guidance procedures (USEPA, 2007 and 2014). Additional features of the modeling approach are listed below.

- Anthropogenic and non-anthropogenic model-ready emissions for the 2012 base case were developed as described in the emission inventory TSD.
- Photochemical grid modeling was based on CAMx version 6.20 with the Carbon Bond 6 revision 2h (CB6r2h) photochemical mechanism, including active excess methane emissions and halogen chemistry.
- Day-specific boundary conditions (BCs) for the lateral boundaries of the 36-km modeling domain were based on 2012 GEOS-Chem global chemistry model (GCM) output.
- A model performance evaluation was conducted for the initial 2012 base case simulation using all available aerometric data within the modeling domain. Based on these initial results, a number of potential issues with model inputs were identified and appropriate modifications tested to confirm that the extent to which the modifications resolved the identified issues and resulted in improved model performance. These initial results and test results are described in **Section H.5**. Revised inputs were then used in the final model simulations and revised model performance metrics based on the final model runs were prepared. Results of the final model performance evaluation are also presented in **Section H.5**.

H.4.2 Model Grid Configuration

The PGM domain configuration is comprised of a system of nested grids with 36-, 12-, and 4-km horizontal resolution as shown in **Figure H-5**. **Table H-8** provides the modeling grid definitions for the WRF and CAMx simulations. Since a large portion of the eastern GOM is under Congressional moratoria (GOMESA), the 4-km PGM domain excluded this area to limit the grid dimension to allow for a more manageable size for computation efficiency.

Table H-8. Domain Grid Definitions for the WRF and CAMx/CMAQ Modeling.

Modeling Grid	WRF		CAMx	
	Origin[1] Coordinates (x, y) (km)	Grid Dimension (column × row)	Origin[1] Coordinates (x, y) (km)	Grid Dimension (column × row)
36-km grid	(-2592, -2304)	(164 × 128)	(-2736, -2088)	(148 × 112)
12-km grid	(-1008, -2016)	(264 × 186)	(-948, -1956)	(254 × 176)
4-km grid	(-156, -1704)	(480 × 210)	(-136, -1684)	(299 × 200)

[1] Southwest corner of each domain grid.

For CAMx, BCs for the 12-km domain were extracted from the 36-km simulation results, and the 12-and 4-km grids were modeled using 2-way nesting (allowing interactions between the two grids in both directions). Specification of the CAMx vertical domain structure depends on the definition of the WRF vertical layers structure. The WRF simulation was run with 33 vertical layer interfaces (which is equivalent to 32 vertical layers) from the surface up to 50 mbar (approximately 20 km above mean sea level [AMSL]). The WRF model employs a terrain following coordinate system called eta (η) coordinate, which is defined by relative pressure differences between layers. As shown in **Table H-9**, the WRF levels are more finely stratified near the surface in an attempt to improve simulation of the atmospheric boundary layer structure and processes. A layer collapsing scheme is adopted for the CAMx simulations whereby multiple WRF layers are combined into single CAMx layers to improve the PGM computational efficiency. **Table H-9** also shows the layer collapsing from the 32 WRF layers to 28 PGM layers. The mixing heights over the study domain are typically below 2 km. Therefore, the WRF modeling layers up to the 16th layer (approximately 2 km) are directly mapped to the PGM layers (no layer-collapsing) to better simulate the stable thermal stratification of the boundary layer and avoid errors potentially introduced by layer collapsing. Above the 20th WRF layer, two WRF layers were combined into a single PGM layer up to the 50 hPa region top.

Table H-9. Vertical Layer Interface Definition for WRF Simulations (left-most columns) and the Layer-collapsing Scheme for the CAMx/CMAQ Layers (right columns).

WRF					CAMx/CMAQ		
Layer Interface	Eta (η)	Pressure (mbar)	Height (m)	Thickness (m)	Layer	Layer Top Height (m)	Thickness (m)
33	0.0	50	19,594.2	2,090.8	24	19,594.2	3,972.6
32	0.027	76	17,503.4	1,881.8			
31	0.06	107	15,621.6	1,754.7	23	15,621.6	3,484.9
30	0.1	145	13,866.9	1,730.1			
29	0.15	193	12,136.7	1,412.6	22	12,136.7	2,614.2
28	0.2	240	10,724.1	1,201.6			
27	0.25	288	9,522.5	1,050.2	21	9,522.5	1,986.1
26	0.3	335	8,472.3	935.8			
25	0.35	383	7,536.4	846	20	7,536.4	1,693.2
24	0.4	430	6,690.5	847.3			
23	0.455	482	5,843.2	910.3	19	5,843.2	1,679.1
22	0.52	544	4,932.9	768.8			
21	0.58	601	4,164.1	711.8	18	4,164.1	1,375.4
20	0.64	658	3,452.2	663.5			
19	0.7	715	2,788.7	418.9	17	2,788.7	821.1
18	0.74	753	2,369.8	402.1			
17	0.78	791	1,967.6	386.8	16	1,967.6	386.8
16	0.82	829	1,580.8	280.8	15	1,580.8	280.7
15	0.85	858	1,300.1	273.3	14	1,300.1	273.4
14	0.88	886	1,026.7	178.3	13	1,026.7	178.2
13	0.9	905	848.5	131.7	12	848.5	131.8
12	0.915	919	716.7	130.1	11	716.7	130.1
11	0.93	934	586.6	85.8	10	586.6	85.8
10	0.94	943	500.8	85.1	9	500.8	85.1
9	0.95	953	415.7	84.5	8	415.7	84.5
8	0.96	962	331.2	83.8	7	331.2	83.8

WRF					CAMx/CMAQ		
Layer Interface	Eta (η)	Pressure (mbar)	Height (m)	Thickness (m)	Layer	Layer Top Height (m)	Thickness (m)
7	0.97	972	247.4	83.1	6	247.4	83.1
6	0.98	981	164.3	57.8	5	164.3	57.8
5	0.987	988	106.5	41.1	4	106.5	41.1
4	0.992	992	65.4	24.6	3	65.4	24.6
3	0.995	995	40.8	20.4	2	40.8	20.4
2	0.9975	998	20.4	20.4	1	20.4	20.4
1	1.0	1,000	0	--	--	--	--

H.4.3 Meteorology

Given the objectives of the air quality analysis and the availability of full annual WRF simulations for 2009 through 2013, the CAMx model was exercised for a full calendar year. The decision to model for an entire calendar year rather than just a single season is consistent with the need to address ozone, $PM_{2.5}$, visibility and annual deposition. Given the extremely hot, dry, and smoky conditions during 2011, the 2012 calendar year was selected for the base year, base case modeling.

Meteorological inputs for CAMx were generated by processing the WRF outputs using appropriate meteorological input preprocessors. The WRFCAMx Version 4.3 was used to translate WRF output meteorological fields to daily CAMx meteorological inputs. For a single day, 25 hours of meteorology must be present (midnight through midnight, inclusive) as these fields represent hourly instantaneous conditions and CAMx internally time-interpolates these fields to each model time step. Precipitation fields are not time-interpolated but rather time-accumulated, so cloud/precipitation files contain one less hour than other meteorological files (e.g., 24 hours of clouds/precipitation vs. 25 hours for other meteorology fields).

Several methodologies are available in WRFCAMx to derive vertical diffusivity (Kv) fields from WRF output. For this modeling, a method consistent with the Yonsei University (YSU) bulk boundary layer scheme (Hong and Noh, 2006; this is the default option in WRF) was used to generate the Kv profile. The lower bound Kv value is set based on the land-use type for each grid cell. Another issue is deep cumulus convection, which is difficult to simulate in a grid model because of the small horizontal spatial scale of the cumulus tower. Inadequate characterization of this convective mixing can cause ozone and precursor species to be overestimated in the boundary layer. To address this issue, a patch was developed that increases transport of air from the planetary boundary layer into the free troposphere and up to the cloud top within cloudy grid cells (ENVIRON, 2012). This patch was shown to improve surface layer ozone in a recent modeling study in Texas (Kemball-Cook et al., 2015), and thus was also employed in this modeling study.

WRFCAMx provides an option to process sub-grid cloud data from WRF fields. Selecting the “DIAG” sub-grid cloud method diagnoses sub-grid cloud fields from WRF gridded thermodynamic fields. The DIAG option is generally selected for the 36- and 12-km WRF output extraction but not for grid spacing less than about 10 km. However, a recent modeling study showed that, without the sub-grid cloud, the 4-km grid produced too much ozone over the Houston area due to enhanced photochemistry (Nopmongcol et al., 2014). Therefore, the DIAG option was used for the 4-km grid as well as the 36- and 12-km grids.

H.4.4 Configuration of Model Input Parameters

Configuration of the CAMx model is summarized in **Table H-10**. Additional key configuration selections include the following:

Chemical Mechanism: Gas phase chemistry using the Carbon Bond 6 revision 2h (CB6r2h) photochemical mechanism including active local excess methane emissions and halogen chemistry. For particles, CAMx was configured to use the Coarse-Fine (CF) aerosol scheme in which primary species are modeled using two static modes (coarse and fine), while all secondary species are modeled as fine particles only.

Photolysis Rates: The CAMx requires a lookup table of photolysis rates as well as gridded albedo/haze/ozone/snow as input. Day-specific ozone column data are based on the Total Ozone Mapping Spectrometer (TOMS) data measured using the satellite-based Ozone Monitoring Instrument (OMI). Albedo is based on land use data, which includes enhanced albedo values when snow cover is present. For CAMx, there is an ancillary snow cover input that is based on WRF output that overrides the land use-based albedo input to use an enhanced snow cover albedo value. The Tropospheric Ultraviolet and Visible (TUV) Radiation Model photolysis rate processor was used. The CAMx is configured to use the in-line TUV to adjust for cloud cover and account for the effects aerosol loadings have on photolysis rates; this latter effect on photolysis may be especially important in adjusting the photolysis rates due to the occurrence of PM concentrations associated with emissions from fires. Note that the same photolysis rates are used in the 2012 base case and future year scenario model runs.

Landuse: Landuse fields were generated based on U.S. Geological Survey (USGS) Geographic Information Retrieval and Analysis System (GIRAS) data[10]. The WRF estimated snow cover data is used to override the USGS land cover categories when snow cover is present.

Meteorological Inputs: The WRF-derived meteorological fields were processed to generate CAMx meteorological inputs for the using the WRFCAMx processor.

Plume in Grid: The subgrid-scale Plum-in-Grid module was not used to avoid unacceptably long model run times and given the fact that most sources in the OCS are far upwind of the receptor sites of interest.

[10] http://pubs.usgs.gov/ds/2006/240/

Boundary Conditions: Boundary conditions (BCs) for the 36-km domain were derived from a GEOS-Chem global chemistry model run for 2012 as described bove. The BCs for the 12/4-km model runs were based on BCs extracted from the 36-km simulations.

Advection/Diffusion Methods: The piecewise parabolic method (PPM) advection solver was used for horizontal transport (Colella and Woodward, 1984), along with the spatially varying (Smagorinsky) horizontal diffusion approach. The CAMx used K-theory for vertical diffusion, using the CMAQ-like vertical diffusivities from WRFCAMx.

Initial Conditions: The 36-km simulation used default initial conditions (ICs) that represent clean remote conditions. A 10-day spin-up period was then used to eliminate any significant influence of the ICs. The ICs and BCs for the nested (12/4-km) grid simulations were extracted from the parent grid simulation outputs with a shorter (3 day) spin-up period.

Boundary Conditions: The lateral boundary conditions (BCs) for the 36-km grid were based on results from a GEOS-Chem GCM simulation for year 2012. The GEOS2CAMx processor was used to interpolate from the GEOS-Chem horizontal and vertical coordinate system to the CAMx coordinate system and to map the GEOS-Chem chemical species to the chemical mechanisms being used by CAMx. The use of an alternative global model (MOZART-4/GEOS5; available at http://www.acd.ucar.edu/wrf-chem/mozart.shtml) as a source for the BCs was explored via a test simulation on the 36-km domain with BCs derived from MOZART and subsequent comparison of model predictions with observations at rural monitoring sites. Results of this comparison indicated slightly worse model performance for ozone when using the MOZART BCs as compared to GEOS-Chem with mixed results for PM depending on species and monitoring network used for evaluation. Based on these results and the fact that, in contrast to GEOS-Chem, MOZART does not use day-specific values for dust emissions, resulted in the selection of BCs based on the GEOS-Chem model.

Table H-10. CAMx Model Configuration.

Science Options	Configuration	Notes
Model Codes	CAMx V6.20	
Horizontal Grid	36/12/4 km	Refer to **Section H.2**
36-km grid	148 x 112 cells	
12-km grid	254 x 176 cells	
4-km grid	299 x 200 cells	
Vertical Grid	19 vertical layers (layer-collapsed from 23 WRF layers)	

Science Options	Configuration	Notes
Grid Interaction	36/12 km one-way nesting 12/4 km two-way nesting	
Initial Conditions	Clean initial conditions	Use 10-day spin-up for the 36-km grid; 3-day spin-up for the nested (12/4 km) grids
Boundary Conditions	36 km from GCM simulation	GEOS-Chem GCM 2012 output data
Land-use Data	Land-use fields based on USGS GIRAS data	
Photolysis Rate Preprocessor	TUV V4.8	Clear-sky photolysis rates based on day-specific Total Ozone Mapping Spectrometer (TOMS) data
Chemistry		
Gas-phase	CB6r2h	Updated isoprene chemistry; heterogeneous hydrolysis of organic nitrates; active methane chemistry and ECH_4 tracer species (Hildebrandt Ruiz and Yarwood, 2013); halogen chemistry (Yarwood et al., 2014)
Aerosol-phase	CF	Coarse and fine mode aerosols
Meteorological Input Preprocessor	WRFCAMx V4.3	Compatible with CAMx V6.20
Diffusion Scheme		
Horizontal-grid	Explicit horizontal diffusion	Spatially varying horizontal diffusivities determined based on the methods of Smagorinsky (1963)
Vertical-grid	K-theory 1st-order closure	WRFCAMx-derived vertical diffusivities based on the Yonsei University (YSU) planetary boundary layer (PBL) scheme (Hong and Noh, 2006); land-use dependent minimum diffusivity (minimum Kv = 0.1 to 1.0 m^2/s) with a cloud Kv patch recently developed to address deep convective mixing (ENVIRON, 2012)
Deposition Scheme		
Dry deposition	ZHANG03	Dry deposition scheme by Zhang et al. (2001; 2003)
Wet deposition	CAMx-specific formulation	Scavenging model for gases and aerosols (Seinfeld and Pandis, 1998)
Numerical Solvers		
Gas-phase chemistry	Euler Backward Iterative (EBI) solver	Hertel et al., 1993
Horizontal advection	Piecewise Parabolic Method (PPM)	Colella and Woodward, 1984
Vertical advection	Implicit scheme w/ vertical velocity update	

H.5 Model Performance Evaluation

Results from the CAMx base case model runs were compared with available air quality observations within the 12/4-km domain to evaluate the ability of the model to accurately reproduce observed conditions. Evaluation of CAMx model performance focused on ozone and PM species as these predictions play the primary role in the air quality impact analysis. Evaluation of the CAMx 2012 base case simulation followed USEPA's current (USEPA, 2007) and new draft (USEPA, 2014)

PGM modeling guidance. The model performance evaluation (MPE) used the Atmospheric Model Evaluation Tool (AMET[11]), which is the evaluation tool discussed in USEPA's latest PGM guidance (USEPA, 2014). Note that AMET requires that a monitoring site have at least 75% valid data capture in order to be used in the MPE, which eliminated observed data from some sites for use in the MPE.

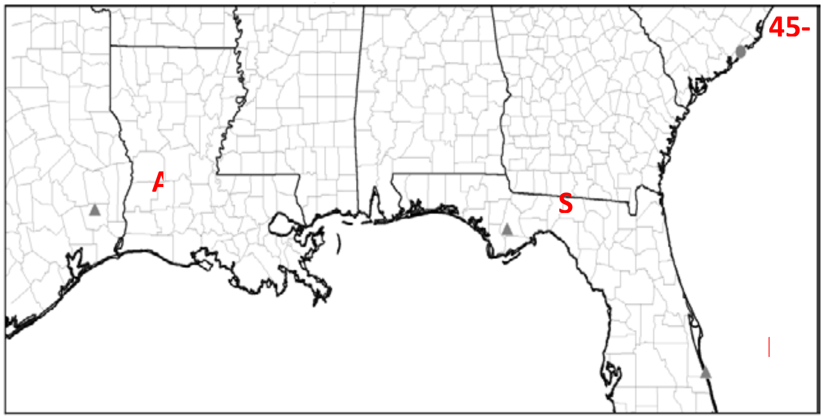
H.5.1 Implications of WRF Model Performance on PGM Simulations

The WRF model performance evaluation results are presented in **Appendix F**. The effects of the meteorological model performance on PGM modeled concentrations, visibility and deposition is difficult to predict given the multiple effects the meteorological model can have. As described in Appendix F, overall WRF model performance was found to be good and significant impediments to PGM model performance due to errors in meteorology are not anticipated.

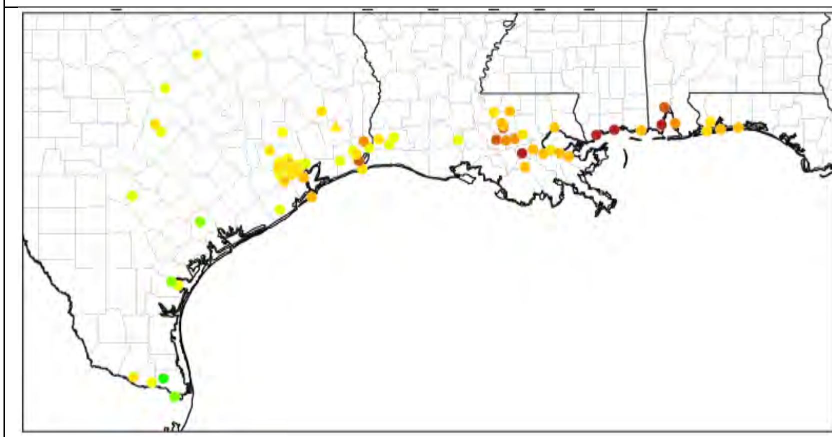
H.5.2 Ambient Data Used In the Model Performance Evaluation

Ozone model performance was evaluated using observed hourly and daily maximum 8-hour (DMAX8) ozone concentrations from the USEPA's Air Qu ality System (AQS[12]) and the Clean Air Status and Trends Network (CASTNet[13]). **Figure H-19** displays the locations of the AQS and CASTNet ozone monitoring sites used in the ozone model performance evaluation. Historically, CASTNet ozone monitoring sites operated by the U.S. Dept. of the Interior's National Park Service (NPS) were included as part of AQS (i.e., ozone compliance monitors), while those operated by the USEPA were not. This has recently been changed and now all CASTNet ozone data are also reported in AQS. Thus, CASTNet ozone monitoring sites operated by the NPS are included in both the AQS and CASTNet monitoring databases. Apart from this overlap, most AQS monitoring sites tend to be more urban-oriented, while CASTNet sites tend to be more rural. Ramboll Environ therefore provides separate performance results for the AQS and CASTNet monitoring sites in order to provide insight into ozone performance at urban vs. rural sites.

[11] https://www.cmascenter.org/help/documentation.cfm?MODEL=amet&VERSION=1.1
[12] http://www.epa.gov/ttn/airs/airsaqs/aqsweb/
[13] http://java.epa.gov/castnet/



CASTNET



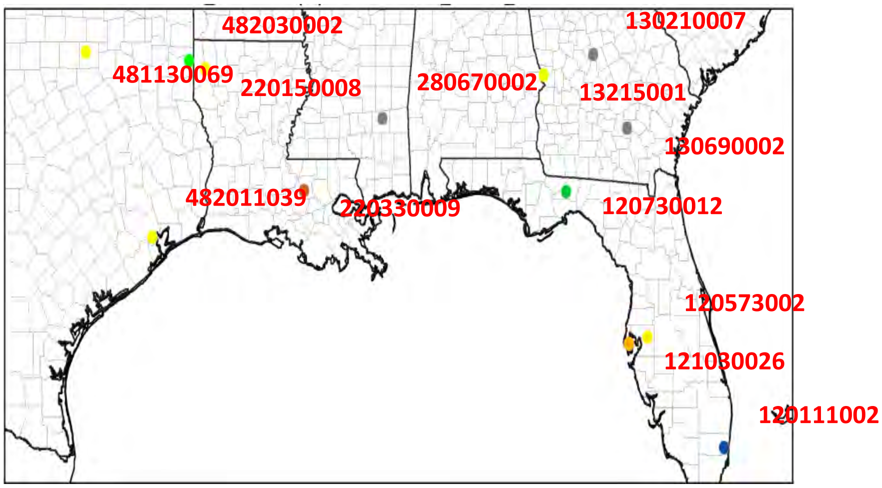
AQS

Figure H-19. Ozone Monitoring Sites Used in the Model Performance Evaluation: CASTNet Sites in the Southeastern U.S. (top) and AQS Sites within the 4-km Modeling Domain (bottom) (color coding of AQS monitor locations is arbitrary).

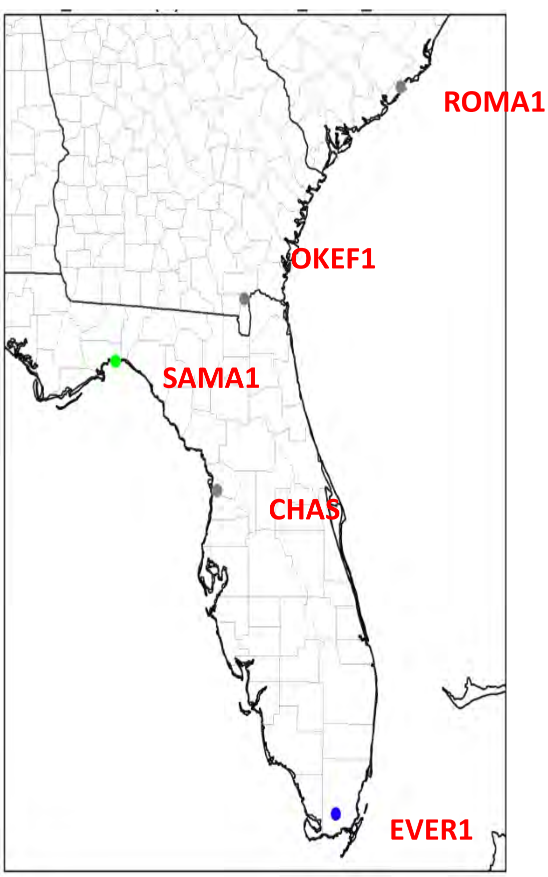
The $PM_{2.5}$ model performance was evaluated using observed speciated PM data from CSN, IMPROVE, and SEARCH monitoring sites in the southeastern U.S. as shown in **Figure H-20**. This was augmented by 24-hour integrated total $PM_{2.5}$ mass measurements using Federal Reference Method (FRM) or equivalent method monitoring sites reporting to the AQS. Most of these FRM sites collect samples on a 1-in-3 day schedule, although some collect data every day. The CSN data consist of 24-hour integrated particulate samples analyzed for SO_4, NO_3, NH_4, EC, OC, and elements using a 1:3 or 1:6 day sampling frequency. The Interagency Monitoring of Protected Visual Environments (IMPROVE[14]) network collects 24-hour average $PM_{2.5}$ and PM_{10} mass and speciated $PM_{2.5}$ concentrations (with the exception of ammonium) using a 1:3 day sampling frequency. The SEARCH network data consist of hourly and 24-hour $PM_{2.5}$ mass and speciated $PM_{2.5}$ data (including ammonia). The FRM and CSN monitoring sites tend to be more urban, whereas the IMPROVE sites are mostly located at national parks and wilderness areas and so are more rural.

There are additional monitoring sites within the modeling domain that collect hourly $PM_{2.5}$ and PM_{10} total mass. However, automated hourly PM measurements are in some cases subject to additional measurement artifacts and uncertainties relative to data collected on filters and do not include speciated PM measurements. Although MPE results were generated using hourly PM data, they are not shown here to maintain consistency with the 24-hour PM NAAQS and the speciated PM results, as well as for the sake of brevity. Some hourly PM data, including speciated PM data, are available at SEARCH network sites. Comparison of MPE results for model bias and error did not show large overall differences between the hourly and daily SEARCH network comparisons.

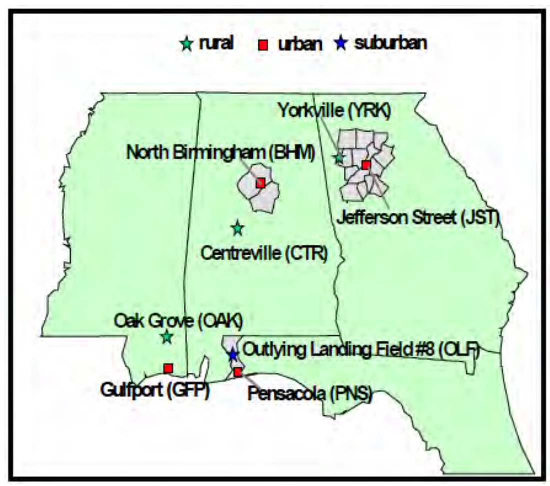
[14] http://vista.cira.colostate.edu/IMPROVE/



CSN



IMPROVE



SEARCH (source: EPRI, 2011)

Figure H-20. Speciated PM Monitoring Sites Used in the Model Performance Evaluation: CSN Network (top), IMPROVE Network (bottom left), and SEARCH Network (bottom right).

H.5.3 Model Performance Statistics

Statistical performance measures applicable to air quality model evaluation are defined in **Table H-11**.

Table H-11. Definitions of Model Performance Evaluation Statistical Metrics.

Statistical Measure	Mathematical Expression	Notes
Ap: Accuracy of paired peak	$\frac{P - O_{peak}}{O_{peak}}$	Comparison of the peak observed value (Opeak) with the predicted value at same time and location
NME: Normalized Mean Error	$\frac{\sum_{i=1}^{N} \lvert P_i - O_i \rvert}{\sum_{i=1}^{N} O_i}$	Reported as %
RMSE: Root Mean Square Error	$\left[\frac{1}{N} \sum_{i=1}^{N} (P_i - O_i)^2 \right]^{1/2}$	Reported as %
FE: Fractional Gross Error	$\frac{2}{N} \sum_{i=1}^{N} \left\lvert \frac{P_i - O_i}{P_i + O_i} \right\rvert$	Reported as % and bounded by 0% to 200%
MAGE: Mean Absolute Gross Error	$\frac{1}{N} \sum_{i=1}^{N} \lvert P_i - O_i \rvert$	Reported as concentration (e.g., µg/m^3)
MNGE: Mean Normalized Gross Error	$\frac{1}{N} \sum_{i=1}^{N} \frac{\lvert P_i - O_i \rvert}{O_i}$	Reported as %
MB: Mean Bias	$\frac{1}{N} \sum_{i=1}^{N} (P_i - O_i)$	Reported as concentration (e.g., µg/m^3)
MNB: Mean Normalized Bias	$\frac{1}{N} \sum_{i=1}^{N} \frac{(P_i - O_i)}{O_i}$	Reported as %
FB: Mean Fractionalized Bias	$\frac{2}{N} \sum_{i=1}^{N} \left(\frac{P_i - O_i}{P_i + O_i} \right)$	Reported as %, bounded by -200% to +200%
NMB: Normalized Mean Bias	$\frac{\sum_{i=1}^{N} (P_i - O_i)}{\sum_{i=1}^{N} O_i}$	Reported as %

For over two decades, ozone model performance for bias and error has been compared against the USEPA's 1991 ozone modeling guidance model performance goals as follows (USEPA, 1991):

- Mean Normalized Bias (MNB) ≤ ±15%
- Mean Normalized Gross Error (MNGE) ≤ 35%

In the USEPA's 1991 ozone modeling guidance, these performance metrics were for hourly ozone concentrations that were consistent with the form of the ozone NAAQS in those days. The MNB performance statistic uses hourly predicted and observed ozone concentrations paired by time and location and is defined as the difference between the predicted and the observed hourly ozone divided by the observed hourly ozone concentrations averaged over all predicted/observed pairs within a given region and for a given time period (e.g., by day, month or modeling period). The MNGE is defined similarly only it uses the absolute value of the difference between the predicted and observed hourly ozone concentrations, so it is an unsigned metric. Note that, because the MNB and MNGE performance metrics divide by the observed ozone concentrations, they weigh performance for low ozone concentrations highly and can become unstable as the observed ozone approaches zero. Consequently, they are no longer recommended. Instead, the Fractional Bias and Error (FB/FE) and Normalized Mean Bias and Error (NMB/NME) are the preferred bias and error statistical performance measures.

For PM species, a separate set of model performance statistics and performance goals and criteria have been developed as part of the regional haze modeling performed by several Regional Planning Organizations (RPOs). The USEPA's modeling guidance notes that PM models might not be able to achieve the same level of model performance as ozone models. Indeed, $PM_{2.5}$ species definitions are defined by the measurement technology used to measure them, and different measurement technologies can produce very different $PM_{2.5}$ concentrations. Given this, several researchers have developed PM model performance goals and criteria that are less stringent than the ozone goals that are shown in **Table H-12** (Boylan, 2004; Boylan and Russell, 2006; Morris et al., 2009a and 2009b). However, unlike the 1991 ozone model performance goals that use the MNB and MNGE performance metrics, the Fractional Bias (FB) and Fractional Error (FE) are typically used for PM species with no observed concentration threshold screening. The FB/FE differs from the MNB/MNGE in that the difference in the predicted and observed concentrations are divided by the average of the predicted and observed values, rather than just the observed value as in the MNB/MNGE. This results in the FB being bounded by -200% to +200%, and the FE being bounded by 0% to +200%. There are additional statistical performance metrics that evaluate correlation, scatter, and normalized mean bias and error (NMB/NME), as shown in **Table H-12**.

Table H-12. Ozone and PM Model Performance Goals and Criteria.

Bias (FB/NMB)	Error (FE/NME)	Comment
≤±15%	≤35%	Ozone model performance goal that would be considered very good model performance for PM species
≤±30%	≤50%	PM model performance Goal, considered good PM performance
≤±60%	≤75%	PM model performance Criteria, considered average PM performance.

More recently, the USEPA compiled and interpreted the model performance from 69 PGM modeling studies in the peer-reviewed literature between 2006 and March 2012 and developed recommendations on what should be reported in a model performance evaluation (Simon et al., 2012). Although these recommendations are not official USEPA guidance, their recommendations were integrated in this CAMx MPE.

- The PGM MPE studies should, at a minimum, report the Mean Bias (MB) and Error (ME or RMSE), and Normalized Mean Bias (NMB) and Error (NME) and/or Fractional Bias (FB) and Error (FE). Both the MNB and FB are symmetric around zero with the FB bounded by -200% to +200%.
- Use of the Mean Normalized Bias (MNB) and Gross Error (MNGE) is not encouraged because they are skewed toward low observed concentrations and can be misinterpreted due to the lack of symmetry around zero.
- The model evaluation statistics should be calculated for the highest resolution temporal resolution available (e.g., hourly ozone) and for important regulatory averaging times (e.g., daily maximum 8-hour ozone).
- It is important to report processing steps in the model evaluation and how the predicted and observed data were paired and whether data are spatially/temporally averaged before the statistics are calculated.
- Predicted values should be taken from the grid cell that contains the monitoring site, although bilinear interpolation to the monitoring site point can be used for higher resolution modeling (<12 km).
- The $PM_{2.5}$ should also be evaluated separately for each major component species (e.g., SO_4, NO_3, NH_4, EC, OA, and remainder other $PM_{2.5}$ [$OPM_{2.5}$]).
- Evaluation should be performed for subsets of the data, including high observed concentrations (e.g., ozone >60 ppb) by subregion and by season or month.
- Spatial displays should be used in the model evaluation to evaluate model predictions away from the monitoring sites. Time series of predicted and observed concentrations at a monitoring site should also be used.
- It is necessary to understand measurement artifacts in order to make meaningful interpretation of the model performance evaluation.

H.5.4 Approach

The PGM evaluation focused on ozone, both hourly and daily maximum 8-hour (DMAX8) ozone concentrations; total $PM_{2.5}$ mass and speciated $PM_{2.5}$ concentrations; gaseous NO_2, SO_2, and CO concentrations; and visibility. The evaluation was performed across all monitoring sites within either the southeastern U.S. as shown in the top panel of **Figure H-20** (in order to capture the regional CSN and IMPROVE network sites) or the 4-km modeling domain (**Figure H-5**), as well as at each individual site on an annual, seasonal (quarterly), and monthly basis. In addition to generating numerous statistical performance metrics (refer to **Table H-11**), graphical representation of model performance used three main types of displays.

- Soccer Plots of monthly bias and error that are compared against the ozone performance goals and the PM performance goals and criteria (refer to **Table H-11**). Monthly soccer plots allow the easy identification of when performance goals/criteria are achieved and an evaluation of performance across seasons.
- Spatial statistical performance maps that display bias/error on a map at the locations of the monitoring sites in order to better understand spatial attributes of model performance, along with tabular summaries of statistical performance metrics.
- Time series plots that compare predicted and observed concentrations at a monitoring site as a function of days.
- Scatter plots of predicted and observed concentrations.

All performance statistics and displays are performed matching the predicted and observed concentrations by time and location using the modeled prediction in the 12/4-km grid cell containing the monitoring site.

The CAMx model performance for PM was evaluated using total $PM_{2.5}$ mass and speciated $PM_{2.5}$ measurements compared against the PM performance goals and criteria given in **Table H-12**. Note that the PM goals and criteria are not as stringent as those for ozone because the measurements themselves, as well as the PM emissions, are much more uncertain and there are more processes involved in PM (e.g., dispersion, transformation and deposition of primary PM and formation of secondary PM from gaseous precursors). Each PM measurement technique has its own artifacts; different measurement technology could produce different observed $PM_{2.5}$ values that differ by as much as 30 percent. The USEPA's latest PGM modeling guidance includes a section on PM measurement artifacts for the monitoring technologies used in routine networks in the U.S. (USEPA, 2014). Thus, the PM model performance needs to recognize these measurement uncertainties and artifacts and take them into account in the interpretation of model performance, as even a "perfect" model may not achieve the PM performance goals and criteria.

The PM_{10} consists of particles with a mean aerodynamic diameter of 10 microns or less and consists of fine ($PM_{2.5}$, i.e. particles with a diameter of 2.5 microns or less) and coarse (PMC, i.e., particles with a diameter between 2.5 and 10 microns) modes. The $PM_{2.5}$ is composed of the following component species:

- sulfate (SO_4) that is typically in the form of ammonium sulfate;
- nitrate (NO_3) that is typically in the form of ammonium nitrate;
- ammonium (NH_4) that is associated with SO_4 and NO_3;
- elemental carbon (EC) that is also called black carbon (BC) and light-absorbing carbon (LAC);

- organic aerosol (OA) that includes primary (POA) and secondary organic aerosol (SOA) and is composed or organic carbon (OC) and other atoms (e.g., oxygen) that are adhered to the OC; and
- other $PM_{2.5}$ ($OPM_{2.5}$) that is primarily crustal in nature (SOIL) but can also include other compounds as well as measurement artifacts.

Model performance statistics were calculated for total PM mass using observations from the FRM, CSN, SEARCH, and IMPROVE networks and then evaluated for PM_{10} and $PM_{2.5}$ component species using data from the CSN, SEARCH, and IMPROVE sites.

H.5.5 Initial Model Performance Results

Results of initial CAMx runs for the 36- and 12-km domains configured as described in **Section H.4** were evaluated in terms of the MPE statistics described above to determine if any corrections or adjustments to model inputs were needed. In some cases, results from CAMx were compared with results from CMAQ to determine potential underlying causes of poor model performance. Results of these analyses indicated ozone and $PM_{2.5}$ over prediction biases, which were especially pronounced along the Gulf Coast. Evaluation of results for individual PM components showed that much of the $PM_{2.5}$ over prediction in coastal areas was associated with over prediction of sea salt emissions as evidenced by over prediction of sodium (Na) and consequently over prediction of nitrate PM as a result of nitrate substitution of chloride ions. This was confirmed by sensitivity tests in which sea salt emissions were reduced by a factor of five as suggested by regressions of predicted vs. observe Na at IMPROVE and CSN monitoring sites.

Consistent with results of other modeling studies in the southeastern U.S., the ozone over prediction bias was judged to likely be associated at least in part with known over prediction biases of ozone over the Gulf of Mexico in many different global models, including GEOS-Chem resulting in over estimates of boundary condition ozone and over prediction of isoprene by the MEGAN biogenic model (Johnson et al., 2015). A series of sensitivity tests based on CAMx performance over the 36-km domain with reduced ozone and ozone precursor BCs and reduced sea salt emissions confirmed that these modifications resulted in generally improved model performance. To this were added two additional modifications: the application of a commonly used adjustment to vertical diffusivity coefficients (Kv patch), which has been shown to improve model performance overnight and in urban areas (ibid); and a reduction in residential wood combustion (RWC) emissions following results of Adelman et al. (2014). A set of final 36-km and 12/4-km model runs were then completed with these modifications in place.

H.5.6 Final Model Performance Results

After making the model input and configuration revisions described in the previous section, CAMx was rerun on the 36-km grid and boundary conditions extracted for the 12/4-km, two-way nested grid run. Results of the MPE for the 12/4-km grid run are presented in this section.

H.5.6.1 Ozone

Model performance results for ozone are summarized in terms of monthly NMB and NME in soccer plots for AQS and CASTNet network monitors within the 4-km and 12-km domains in **Figure H-21**. Model performance for nearly all months is within the ±15% NMB and <35% NME ozone performance goals listed in **Table H-12** (which corresponds to the innermost "goal" box shown in the figure), with the principal exceptions being performance during July and August for sites in the 4-km domain (note only one CASTNet site – site ALC188, Alabama-Coushatta – is located within the 4-km domain).

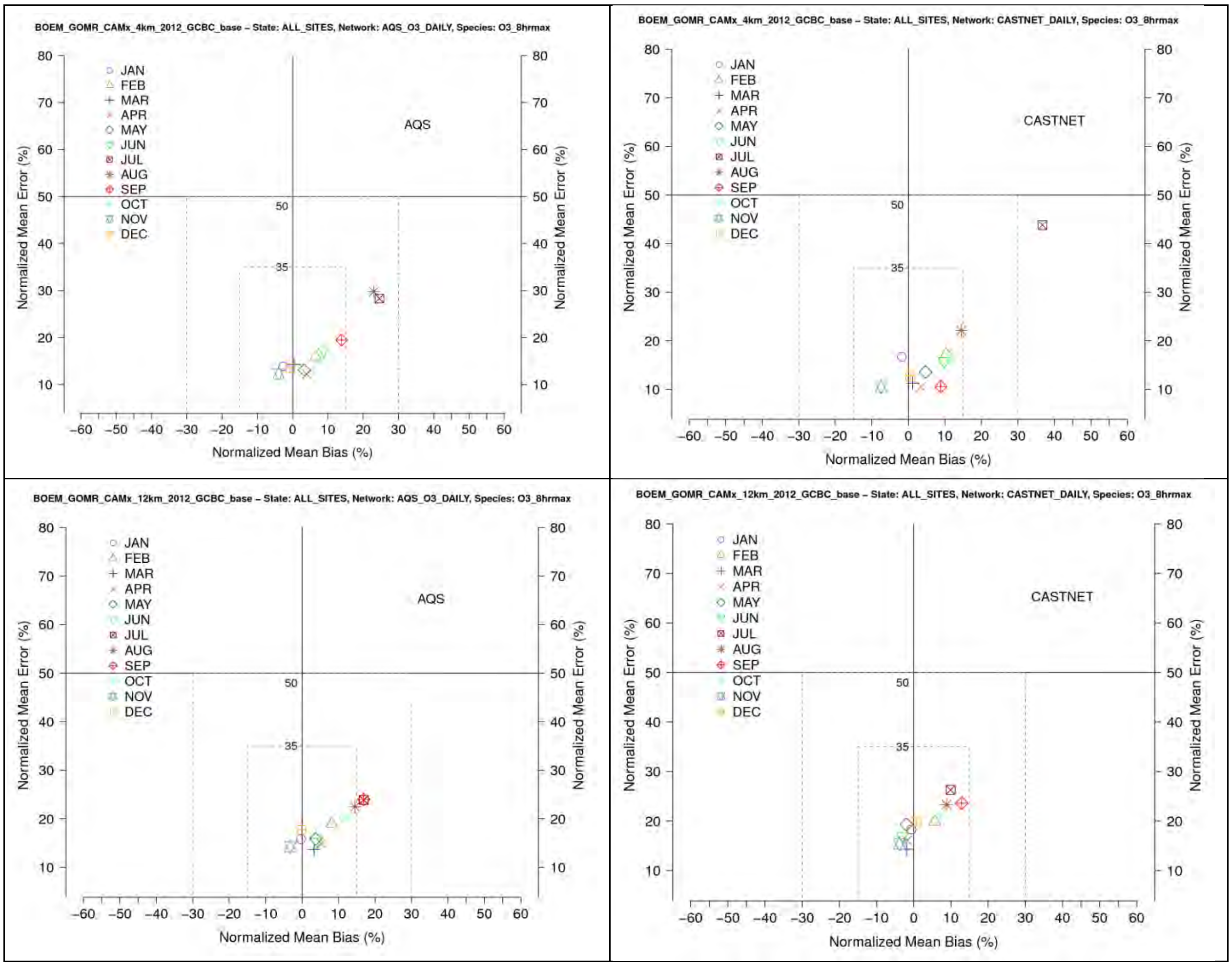


Figure H-21. Monthly Normalized Mean Bias and Normalized Mean Error for Daily Maximum 8-hour Average Ozone at AQS (left) and CASTNet (right) Monitoring Sites Located within the 4-km Modeling Domain (top) and the 12-km Domain (bottom).

As illustrated by the threshold exceedance counts in **Figure H-22**, the ozone season in the far South generally follows a bimodal distribution with a pronounced ozone peak in spring and a secondary peak in late summer to early fall. There is a noticeable lack of high ozone events during July. This seasonal pattern is reproduced in the model results as shown in **Figure H-23**. Model performance statistics generated using the AMET tool are summarized by calendar quarter. We therefore focus further attention on ozone model performance results for Q2 (April-June) and Q3 (July-September), as these roughly coincide with the seasonal ozone peaks.

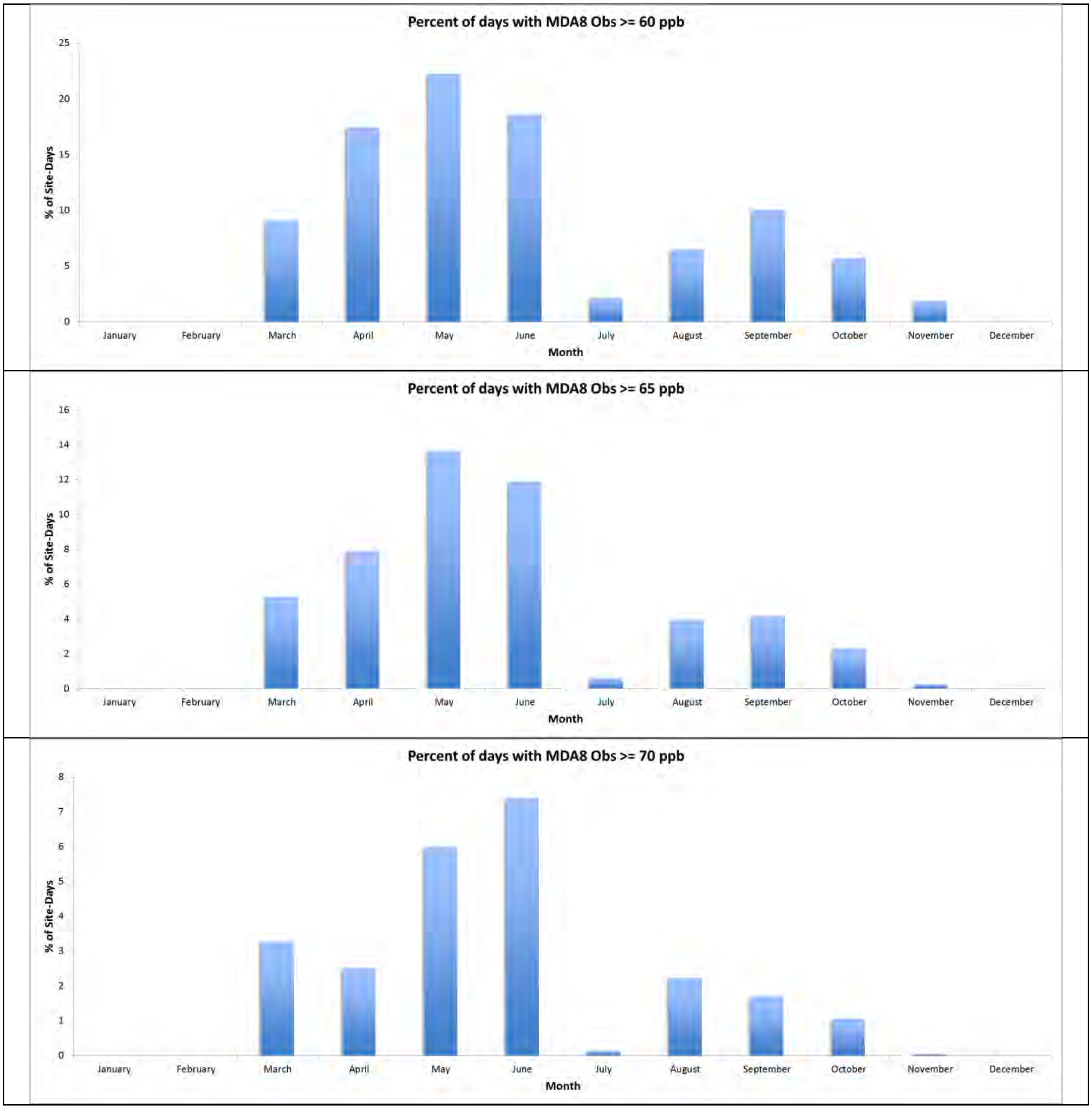


Figure H-22. Fraction of Site-days during Each Month of 2012 with Observed Daily Maximum 8-hour Ozone Exceeding 60 (top), 65 (middle), or 70 (bottom) ppb Over All Monitoring Sites in the 4-km Domain.

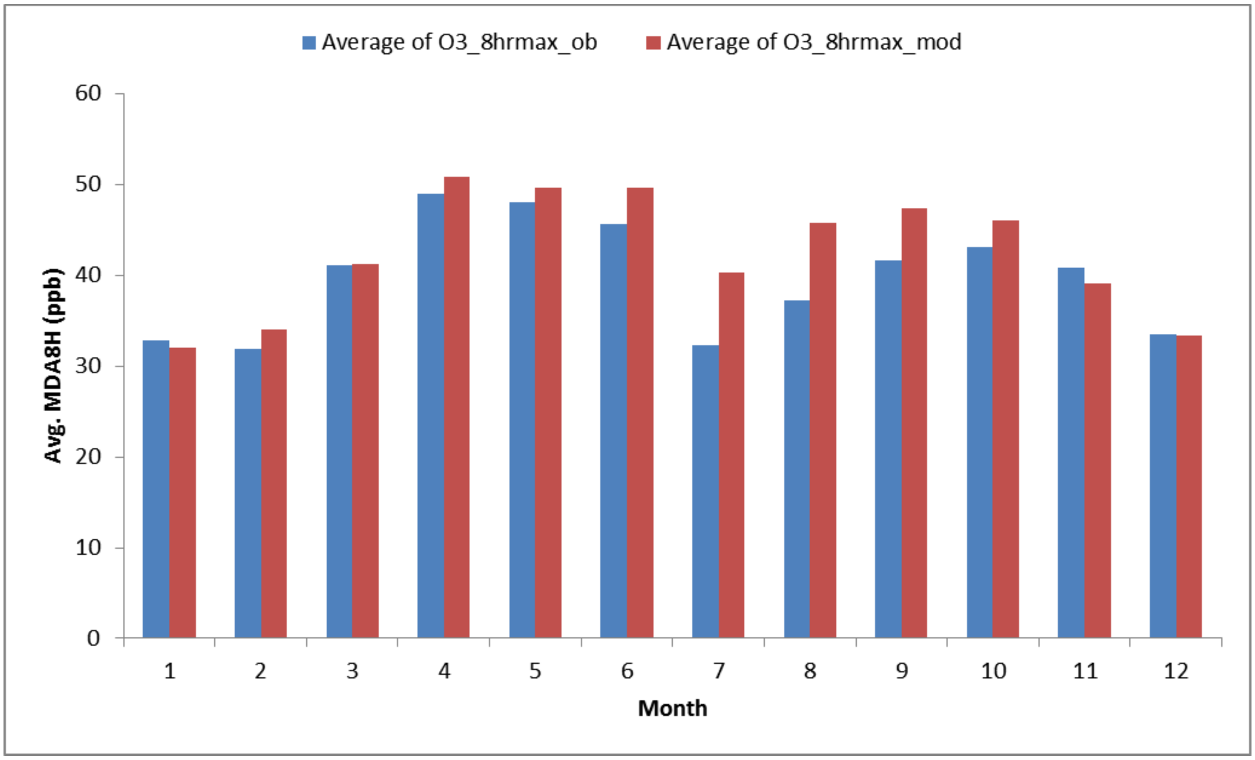


Figure H-23. Observed (blue) and Predicted (red) Monthly Mean Daily Maximum 8-hour Average Ozone Over All Sites in the 4-km Modeling Domain.

Ozone model performance for Q2 (April-May) and Q3 (July-September) over sites in the 4-km domain is illustrated by the scatter plots in **Figure H-24**. Standard scatter plots are shown in the left-hand column and corresponding scatter density plots are shown in the right-hand column. Colors in the scatter density plot indicate the fraction of data in each 2 ppb bin, thus revealing the data density variations that are otherwise obscured in regions with numerous overlapping points in the standard scatter plots. Model performance in Q2 is better than in Q3 primarily due to a lower bias (NMB of 5.2% in Q2 as compared to 20.1% in Q3). The scatter density plots show that the Q3 bias is primarily associated with over prediction of mid- and low-range values with less bias for values exceeding 60 ppb. Summaries of ozone performance statistics with a 60 ppb observed ozone cutoff applied are further discussed below.

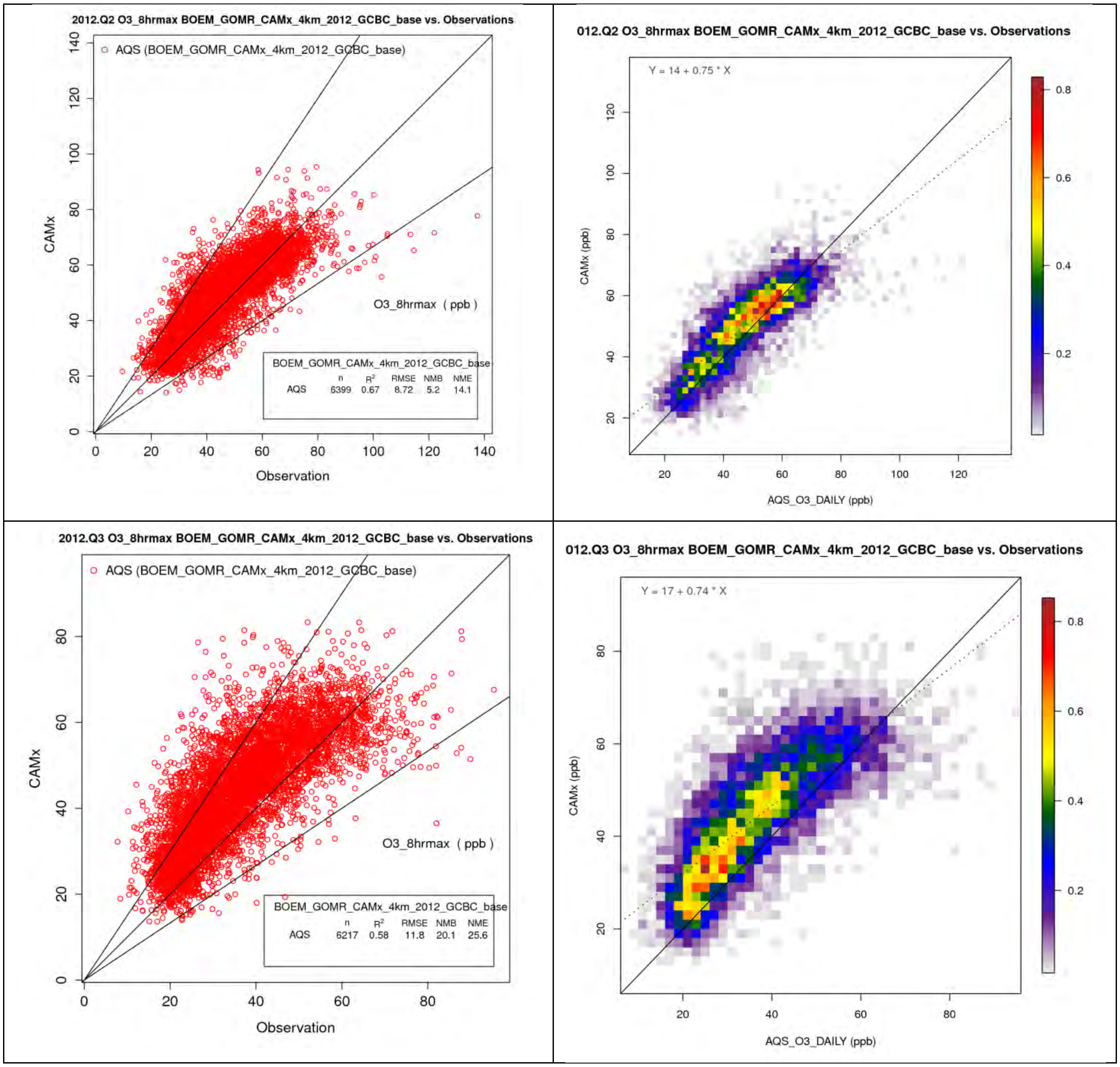
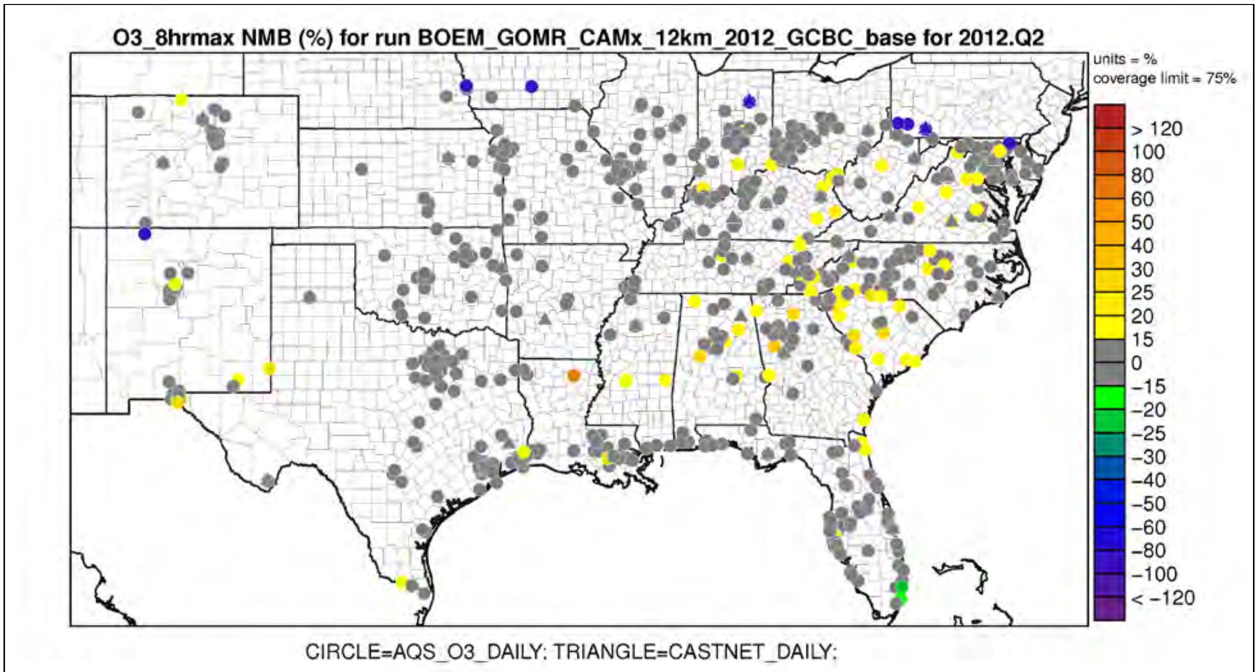


Figure H-24. Scatter (left) and Scatter Density (right) Plots for Observed vs. Predicted Daily Maximum 8-hour Ozone in Q2 (top) and Q3 (bottom) for All AQS Monitoring Sites in the 4-km Modeling Domain.

The spatial distribution of NMB over the full 12-km domain is shown in **Figure H-25**. Note that these results are based on the 12-km gridded model resolution for all sites shown. The NMB is within ±15% at most sites during Q2 but exceeds +15% at most sites along the Gulf Coast and throughout the southern tier and southeast Atlantic States in Q3.



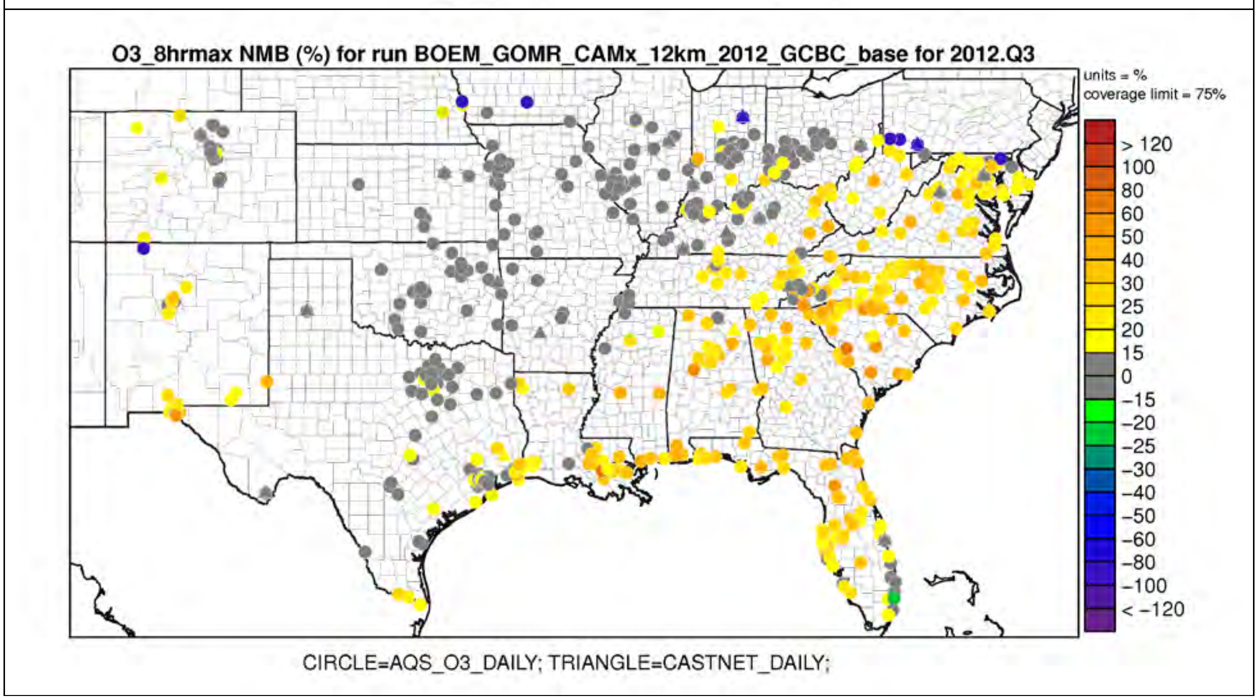


Figure H-25. Normalized Mean Bias (NMB) for Daily Maximum 8-hour Ozone for Q2 (top) and Q3 (bottom).

The USEPA recommends that ozone model performance statistics be calculated using a 60-ppb observed ozone concentration cut-off value (Simon et al., 2012; USEPA, 2014). That is, the model performance statistics are calculated for all predicted and observed ozone pairs matched by time and location for which the observed value is 60 ppb or higher. **Table H-13** lists model performance summary statistics derived from the 4-km resolution model output for hourly and 8-hour daily maximum ozone with no concentration cut-off applied and with cut-offs of 40 or 60 ppb applied for Q2 and Q3. Values of NMB and NME exceeding USEPA's performance goals as listed in **Table H-12** are highlighted. Biases trend from positive to slightly negative as the threshold concentration increases but are always within the Performance Goal for Q2 and also under application of the 40- and 60-ppb thresholds in Q3. The NME is always within the USEPA Performance Goal except for hourly values in Q3 when no cut-off is applied.

Table H-13. Model Performance Statistics at Different Observed Ozone Concentration Screening Thresholds Based on All Monitoring Sites in the 4-km Domain (shaded cells indicate values exceeding USEPA performance goals).

Monitor Site	Q2 (April – June)			Q3 (July – September)		
	N	NMB (%)	NME (%)		NMB (%)	NME (%)
USEPA Performance Goal		≤±15%	≤35%		≤±15%	≤35%
Ozone Cut-Off Concentrations	DMAX8 Ozone					
0	6399	5.2	14.1	6217	20.1	25.6
40	4326	2.1	11.6	3218	7.9	15.9
60	1246	-5.7	9.9	375	-9.2	12.6
Ozone Cut-Off Concentrations	Hourly Ozone					
0	152327	10.9	30.5	149676	30.6	46.7
40	53213	-3.5	16.7	22751	1.5	19.6
60	11229	-10.6	14.7	3498	-13.9	17.8

Time series of observed and predicted daily maximum 8-hour ozone are plotted in **Figure H-26** for the monitoring site in each county in the Houston-Galveston-Brazoria ozone nonattainment area with the highest ozone design values during the 2010-2014 design value periods (2010-2012, 2011-2013, 2012-2014): Northwest Harris County site (AQS ID 48-201-0029)[15], Manvel Croix Park – Brazoria County (AQS ID 48-039-1004), and Galveston 99th St. – Galveston County (AQS ID 48-167-1034).

Time series of observed and predicted daily maximum 8-hour ozone are plotted in **Figure H-27** for two monitoring sites in the Baton Rouge ozone nonattainment area: LSU (AQS ID 22-033-0003) and Carville (AQS ID 22-047-0012). These sites typically had the highest ozone design values in the Baton Rouge area during the 2010-2014 design value periods.

The time series for the ALC188 (Alabama-Coushatta, Texas) CASTNet site (the only CASTNet site in the 4-km domain) are shown in **Figure H-28**.

Overall model performance as seen in these time series is good, especially in Q2 and especially in the Houston-Galveston area. There is a tendency towards over prediction in Q3 at

[15] This site recorded either the maximum or was within 1 ppb of the maximum ozone design value of all sites in Harris County during this period.

Galveston and more noticeably at the Baton Rouge sites, consistent with the results for all sites presented above.

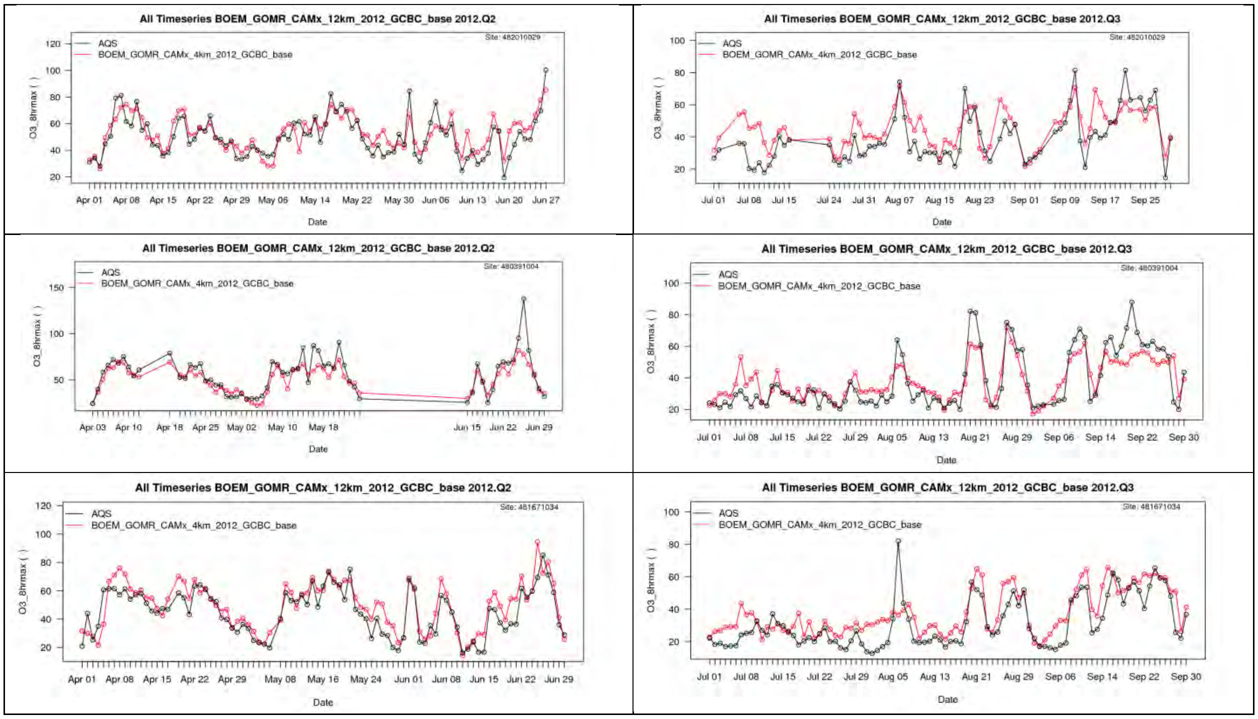


Figure H-26. Time Series of Daily Maximum 8-hour Ozone at Monitoring Sites with Highest Design Values in Harris (top), Brazoria (middle), and Galveston (bottom) Counties, Texas, for Q2 (left) and Q3 (right).

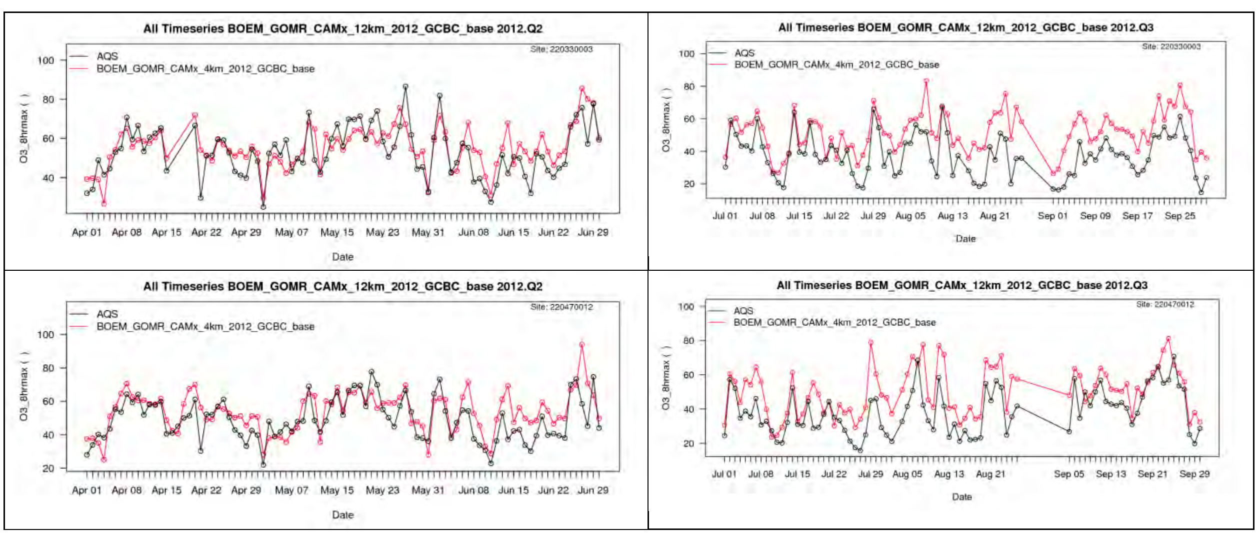


Figure H-27. Time Series of Daily Maximum 8-hour Ozone at Monitoring Sites in the Baton Rouge Nonattainment Area: LSU (top) and Carville (bottom) for Q2 (left) and Q3 (right).

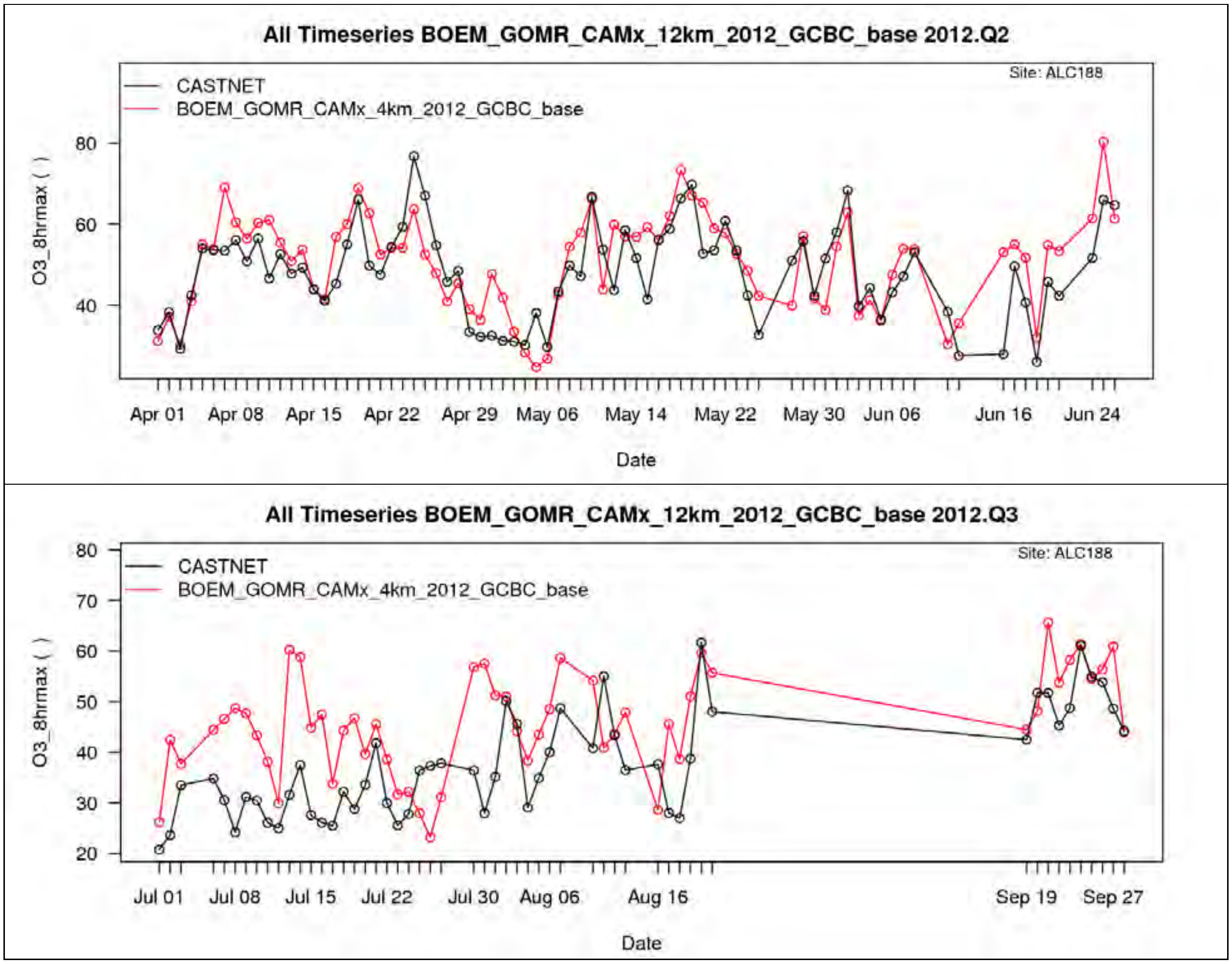


Figure H-28. Time Series of Daily Maximum 8-hour Ozone at the ALC188 (Alabama-Coushatta, Texas) CASTNet Monitoring Site for Q2 (top) and Q3 (bottom).

H.5.6.2 Particulate Matter

The CAMx model performance for particulate matter (PM) was evaluated for total $PM_{2.5}$ mass and speciated $PM_{2.5}$ measurements. The PM performance was compared against the performance goals and criteria given in **Table H-12**. Note that the PM goals and criteria are not as stringent as those for ozone because both PM measurements and PM emissions are subject to greater uncertainties and PM formation and transformation processes are more complex and difficult to model. Each PM measurement technique has its own artifacts; different measurement technologies can produce different observed $PM_{2.5}$ values that differ by as much as 30 percent. The USEPA's latest PGM modeling guidance includes a section on PM measurement artifacts for the monitoring technologies used in routine networks in the U.S. (USEPA, 2014). The PM model performance results must be evaluated in light of these measurement uncertainties and artifacts as even a "perfect" model may not achieve the PM performance goals and criteria relative to the imperfect measurements.

The PM_{10} consists of particles with a mean aerodynamic diameter of 10 microns or less and consists of fine ($PM_{2.5}$, i.e. particles with a diameter of 2.5 microns or less) and coarse (PMC, i.e., particles with diameter between 2.5 and 10 microns) modes. The $PM_{2.5}$ is composed of the following component species:

- sulfate (SO_4) that is typically in the form of ammonium sulfate;
- nitrate (NO_3) that is typically in the form of ammonium nitrate;
- ammonium (NH_4) that is associated with SO_4 and NO_3;
- elemental carbon (EC) that is also called black carbon (BC) and light-absorbing carbon (LAC);
- organic aerosol (OA) that includes primary (POA) and secondary organic aerosol (SOA) and is composed or organic carbon (OC) and other atoms (e.g., oxygen) that are adhered to the OC; and
- other $PM_{2.5}$ ($OPM_{2.5}$) that is primarily crustal in nature (SOIL) but can also include other compounds such as sea salt and may include measurement artifacts as it is determined by subtraction of the sum of individual measured species from the measured total $PM_{2.5}$.

In the following subsections, we first evaluate the CAMx 2012 base case simulation for total $PM_{2.5}$ mass using observations from the FRM, CSN, and IMPROVE monitoring networks and then evaluate results for PM_{10} and $PM_{2.5}$ component species. There are also numerous hourly $PM_{2.5}$ and PM_{10} monitoring sites in the region that are also used in the MPE, but results for these are not presented here as they may suffer from additional measurement artifacts and uncertainties and are not directly comparable to the speciated PM data.

H.5.6.2.1 Total $PM_{2.5}$ Mass

Daily total $PM_{2.5}$ mass is measured at FRM, IMPROVE, and CSN network monitors, and hourly $PM_{2.5}$ is measured at FRM equivalent and non-FRM monitoring sites. Because only three CSN sites and no IMPROVE network sites are located within the 4-km CAMx modeling domain, some performance statistics are presented here for all monitors within the southeastern U.S. domain shown in **Figure H-29**.[16]

[16] This area corresponds to the high-resolution domain used for the meteorological (WRF) modeling described in **Section 2**.

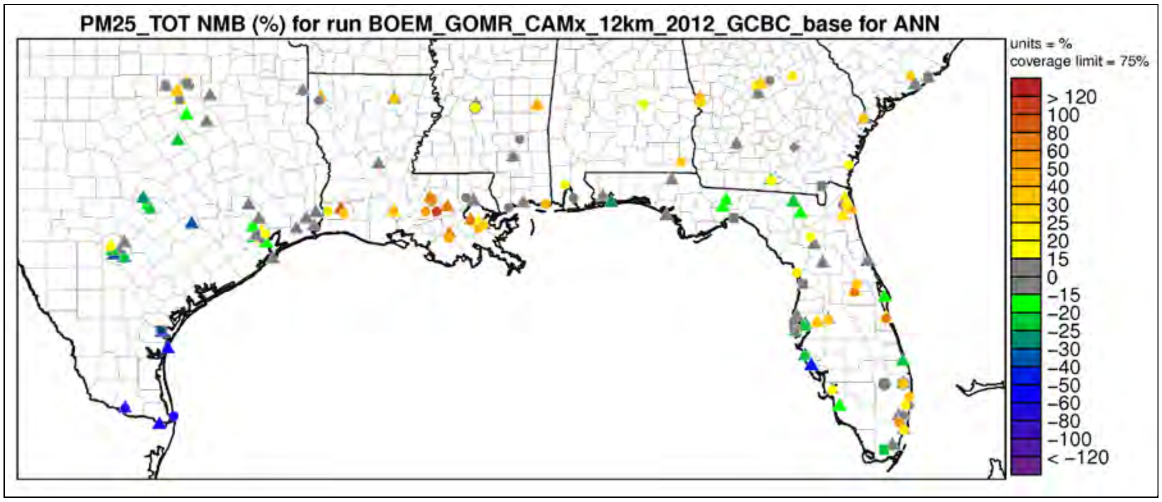


Figure H-29. PM Monitoring Sites in the Southeastern U.S. Domain (triangles – AQS hourly, square – IMPROVE, diamond – CSN, circles – AQS FRM daily).

Figure H-30 displays soccer plots of total $PM_{2.5}$ mass model performance across the FRM, CSN, and IMPROVE monitoring networks in the southeastern U.S. domain. Note that these results are based on 12-km resolution CAMx output. Also shown in the soccer plots are boxes that represent the performance goals for ozone (most inner) and PM (middle), and the PM performance criteria (most outer). Performance for the late fall and winter months (October-February) is characterized by larger positive NMB and higher NME in each network. This bias is somewhat more extreme in the FRM data. Performance results are within or nearly within the PM performance goals except for January and October-December for all networks and within the PM performance criteria for all months at all networks.

As illustrated in **Figure H-31**, over prediction in Q4 appears to be primarily associated with “other $PM_{2.5}$” ($OPM_{2.5}$). Measured OPM likely consists mostly of crustal material (dust) in addition to sea salt. Modeled $OPM_{2.5}$ is defined as the sum of unspeciated PM, crustal material, and sea salt.

Comparisons of particulate OC and EC performance statistics are presented in **Figure H-32**. The NMB and NME are within the PM performance goals with the exception of July and August EC predictions at CSN sites; the over prediction bias is smaller at SEARCH sites. Note that both the SEARCH and CSN networks use the Thermal Optical Reflectance (TOR) method to determine OC and EC.

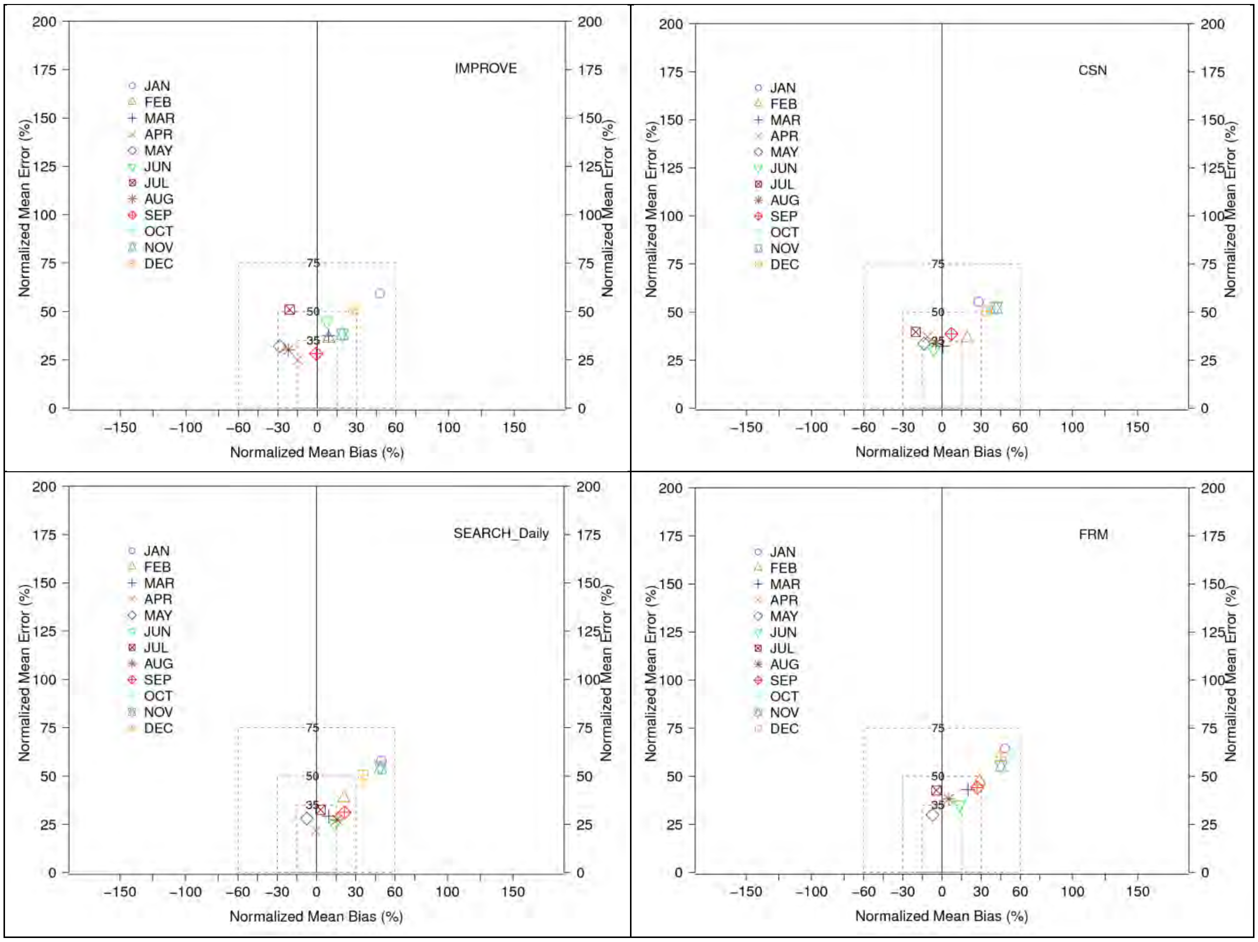


Figure H-30. Soccer Plots of Total $PM_{2.5}$ Mass Model Performance Across the IMPROVE (top left), CSN (top right), SEARCH (bottom left), and FRM Daily (bottom right) Monitoring Networks for Sites in the Southeastern U.S. Domain.

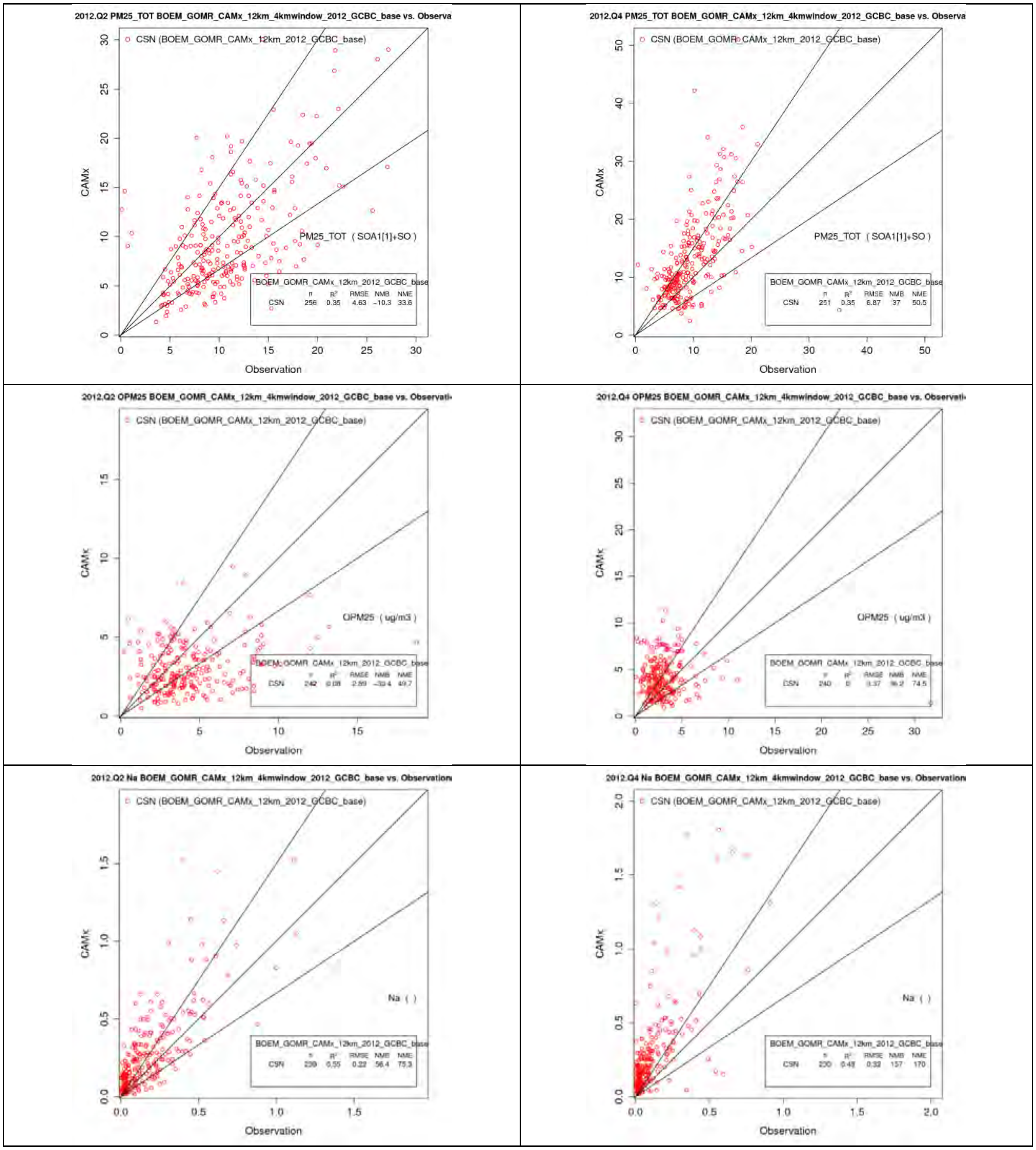


Figure H-31. Comparisons of Predicted with Observed Daily Average PM at CSN Network Sites in the Southeastern U.S. for Q2 (left) and Q4 (right) for Total $PM_{2.5}$ (top), Other $PM_{2.5}$ (middle), and Sodium (bottom).

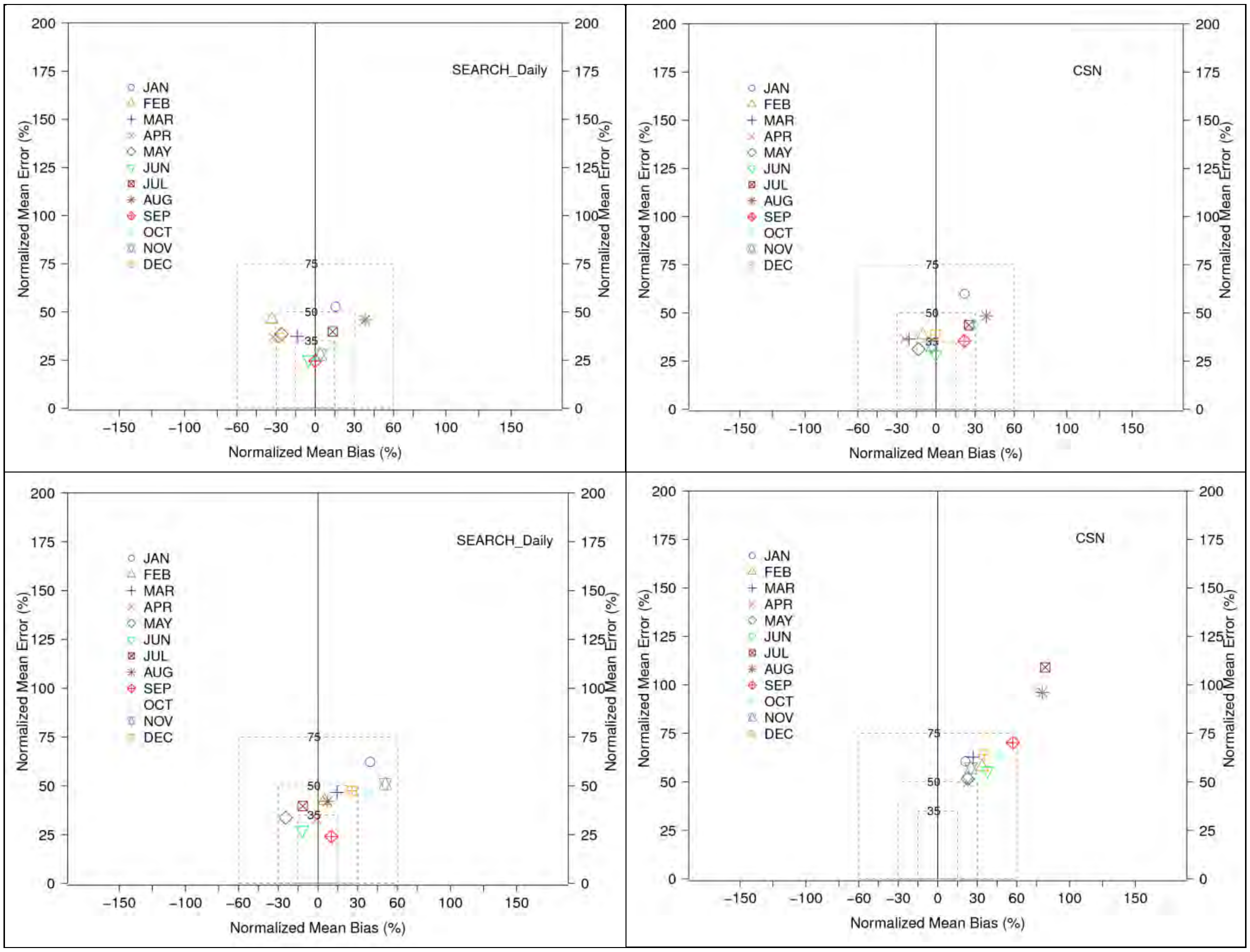


Figure H-32. Comparisons of Observed vs. Predicted OC (top) and EC (bottom) at SEARCH (left) and CSN (right) Network Sites in the Southeastern U.S.

H.5.6.2.2 Nitrogen Species (NO_2, NO_y, and NO_3)

Soccer plot summaries of NMB and NME for nitrogen species are shown in **Figure H-33 and Figure** H-34 for monitoring sites in the 4-km domain. The NO_2, NOy, and particulate NO_3 are over predicted, especially in the summer months. The NO_3 over prediction at coastal sites could be at least partially due to over prediction of sea salt emissions as a result of Cl- ion substitution. This is consistent with under prediction of particulate Cl at some sites despite over prediction of Na. Nitrate deposition biases fall within the performance criteria in all but one month, but errors are large indicating a lack of model precision. Measurement uncertainties may also be contributing to the large errors.

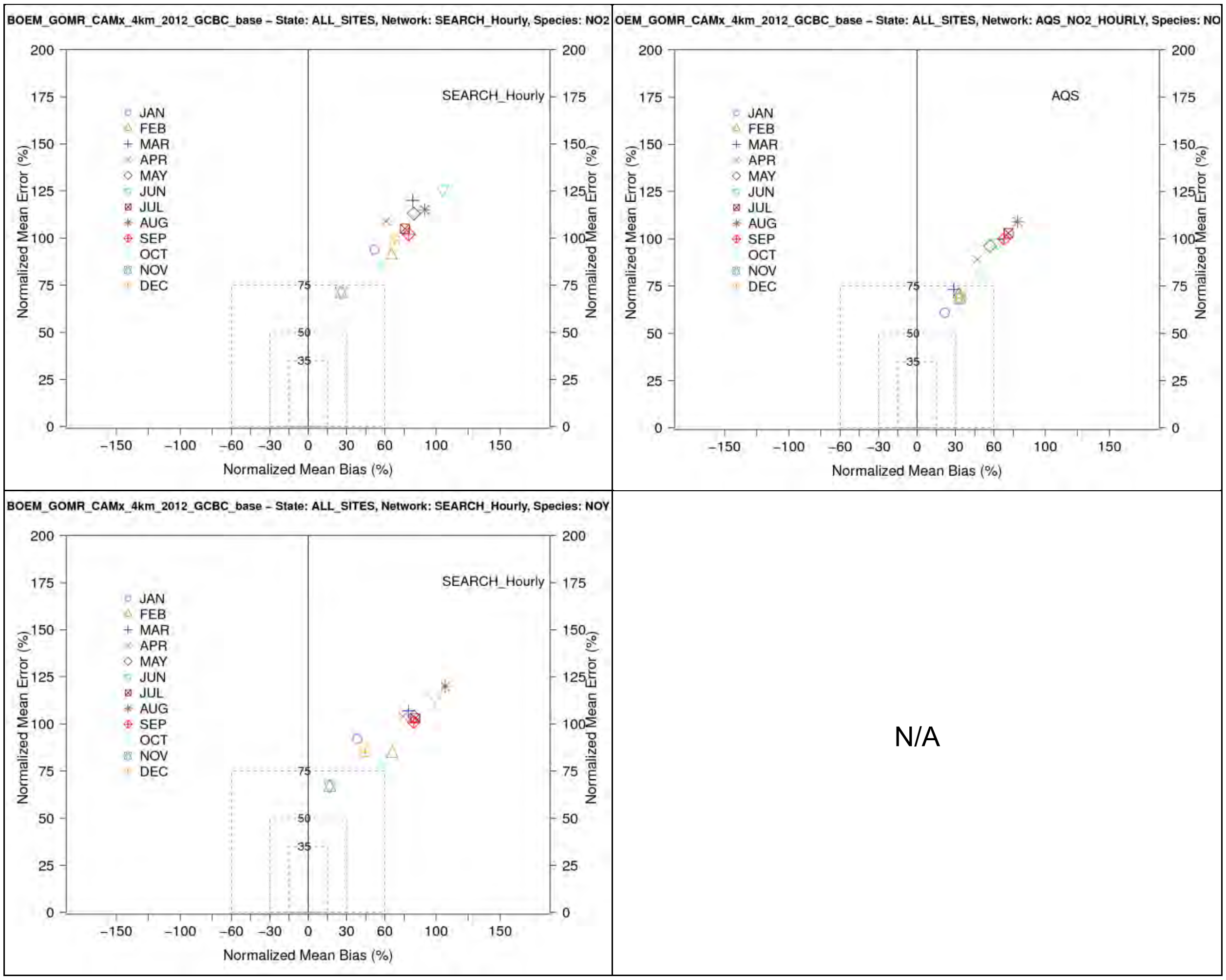


Figure H-33. Monthly Normalized Mean Bias and Normalized Mean Error for Hourly NO_2 (top) and Daily NOy (bottom) at SEARCH Network Sites (left) and AQS Sites (right) in the 4-km Domain.

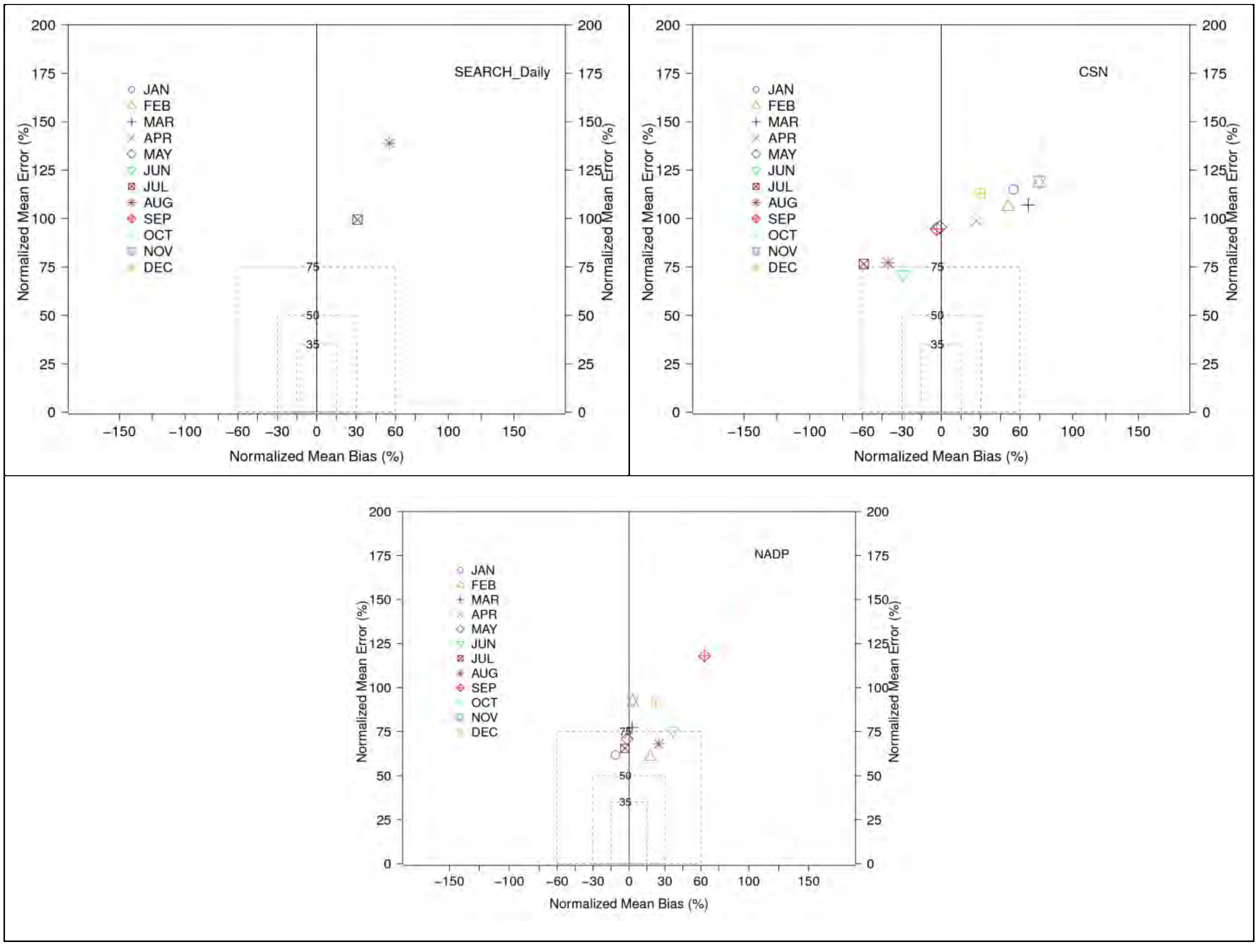


Figure H-34. Monthly Normalized Mean Bias and Normalized Mean Error for NO_3 at SEARCH Network Monitoring Sites (top left) and AQS Sites (top right) and NO_3 Deposition at NADP Sites (bottom) in the Southeastern U.S. (Note: Additional months for SEARCH NO_3 not shown as the NMB and NME exceed the upper axis limits.)

H.5.6.2.3 Sulfur Species (SO_2 and SO_4)

Model performance for hourly SO_2 within the 4-km domain is summarized in terms of monthly NME and NMB in **Figure H-35**. The AQS network SO_2 monitors are typically cited to represent the influence of major utility or industrial SO_2 sources and thus may measure short-term peaks associated with plume impacts from a discrete source. As a result, the timing, location, and magnitudes of peak SO_2 concentrations are not well represented within the 4-km grid modeling results. In addition, monitors near large ports may be influenced by discrete plumes from passing marine vessels, which could be sufficient to cause 1-hour peaks in the monitoring data. Since marine vessel emission inputs to the model are temporally averaged, these discrete events cannot be properly simulated by the model. Given these characteristics of the SO_2 monitoring data, we would expect large 1-hour SO_2 modeling errors as shown in **Figure H-35**, although we would not necessarily expect the positive normalized mean biases that occur in every month.

Over prediction bias of hourly SO_2 at SEARCH network sites seen in the top row of **Figure H-35** is in contrast to lower SO_4 bias shown in the next row. Good performance for SO_4 is also evident at CSN network sites. The SO_4 deposition is under predicted in most months. Reasons for the overall SO_2 over prediction bias at sites in the 4-km domain (top row of **Figure H-33**) are not immediately apparent. Examination of results over all sites in the 12-km domain (**Figure H-36**) shows wide variations in bias from site-to-site, including between sites in the 4-km domain, suggesting that the lower bias in the network average performance statistics in **Figure H-33** are partly the result of over- and under-predictions cancelling each other out.

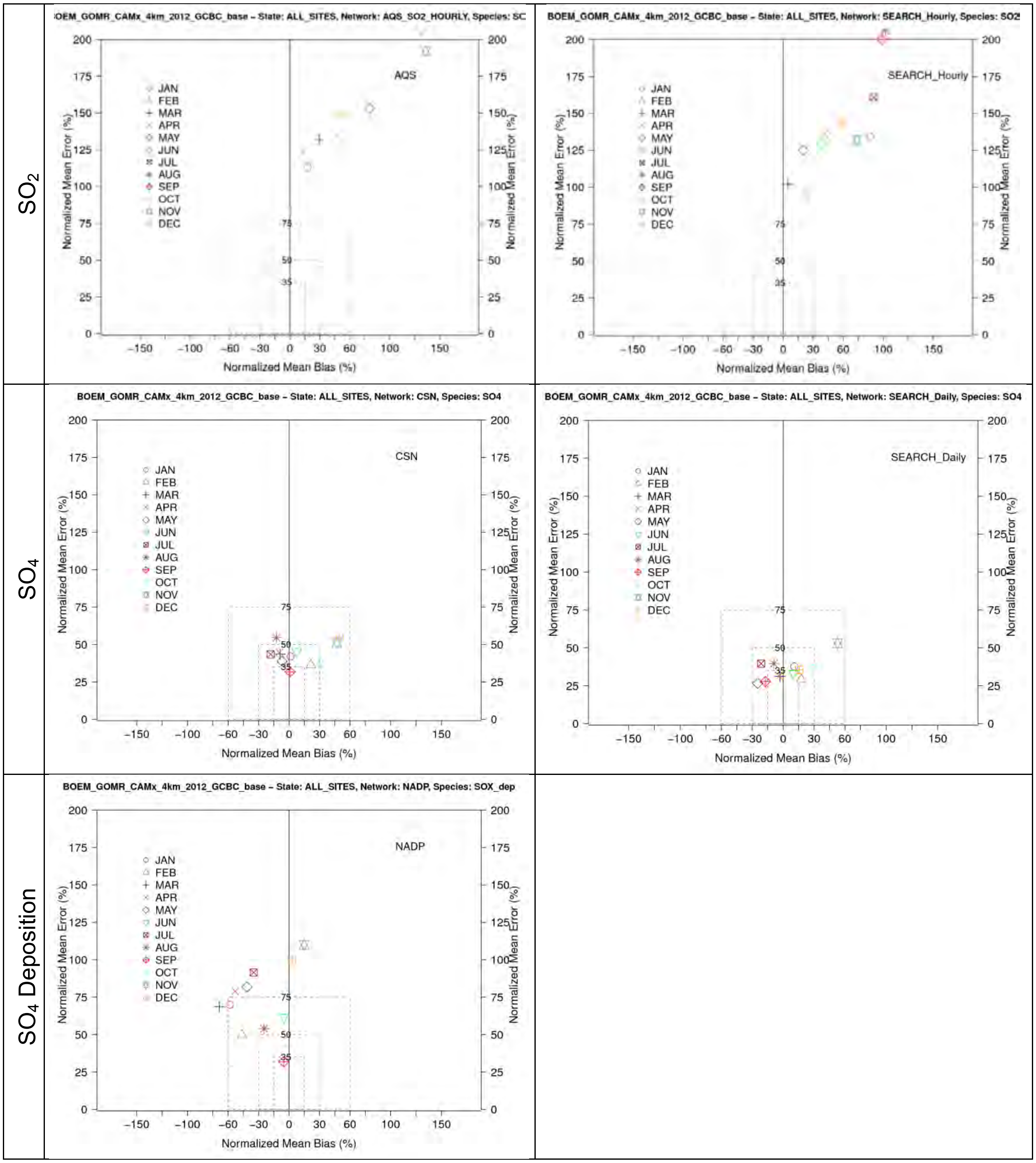


Figure H-35. Monthly Normalized Mean Bias and Normalized Mean Error at Monitoring Sites in the 4-km Domain for SO$_2$ (top row, AQS sites left panel, SEARCH sites right panel), SO$_4$ (middle row, CSN sites left panel, SEARCH sites right panel), and SO$_4$ Deposition Measured at NADP Sites (bottom row).

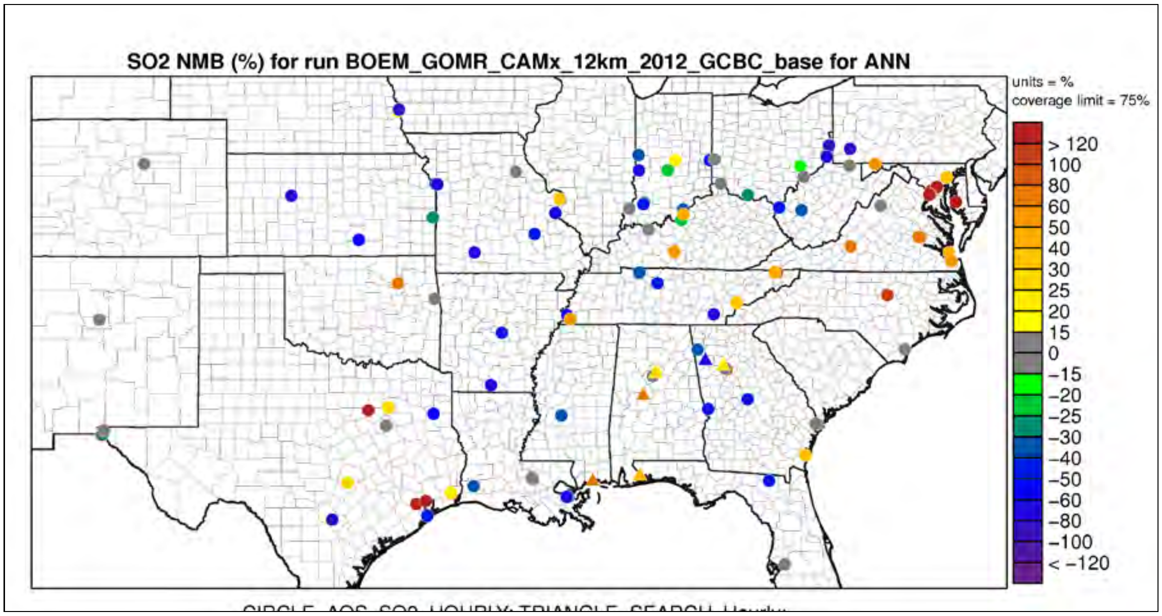


Figure H-36. Annual Normalized Mean Bias for Hourly SO_2 (based on 12-km resolution CAMx results).

H.5.6.2.4 Ammonium (NH_4)

Model performance for particulate ammonium at monitors within the 4-km domain is summarized in terms of monthly NME and NMB in **Figure H-37**. Performance at the two SEARCH network sites falls within the PM criteria bounds, but positive biases and large errors are seen at the three CSN sites. Note that results based on all sites in the southeastern U.S. domain (at 12-km resolution) are very similar. The NH_4 overestimation bias at the CSN sites is likely due to NO_3 over-prediction (**Figure H-34**), as SO_4 is showing biases closer to zero (**Figure H-35**). Examination of individual CSN site results shows acceptable performance at the Houston site (NMB=20%, NME=59%), but large positive biases and errors at the Baton Rouge, Louisiana, and Laurel, Mississippi, monitors.

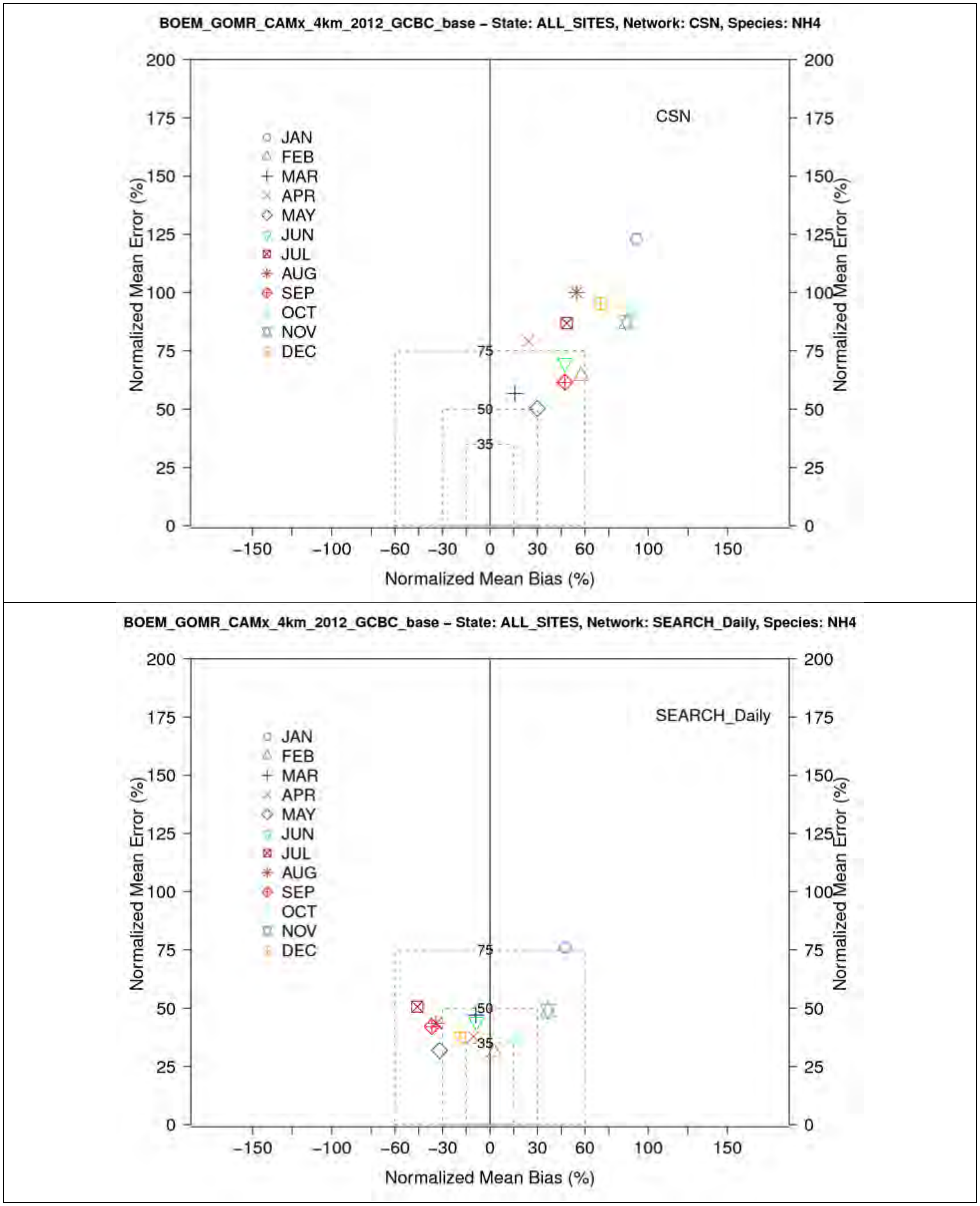


Figure H-37. Monthly Normalized Mean Bias and Normalized Mean Error for Daily Average NH_4 at CSN (top) and SEARCH (bottom) Network Sites in the 4-km Modeling Domain.

H.5.6.2.5 Carbon Monoxide (CO)

Model performance for hourly CO within the 4-km domain is summarized in terms of monthly NME and NMB in **Figure H-38**. Hourly CO is under predicted on average at AQS sites where the influenced of local mobile sources at sub-grid scales is not adequately resolved by the model's 4-km grid resolution; model performance is better at the SEARCH sites, several of which are in rural locations.

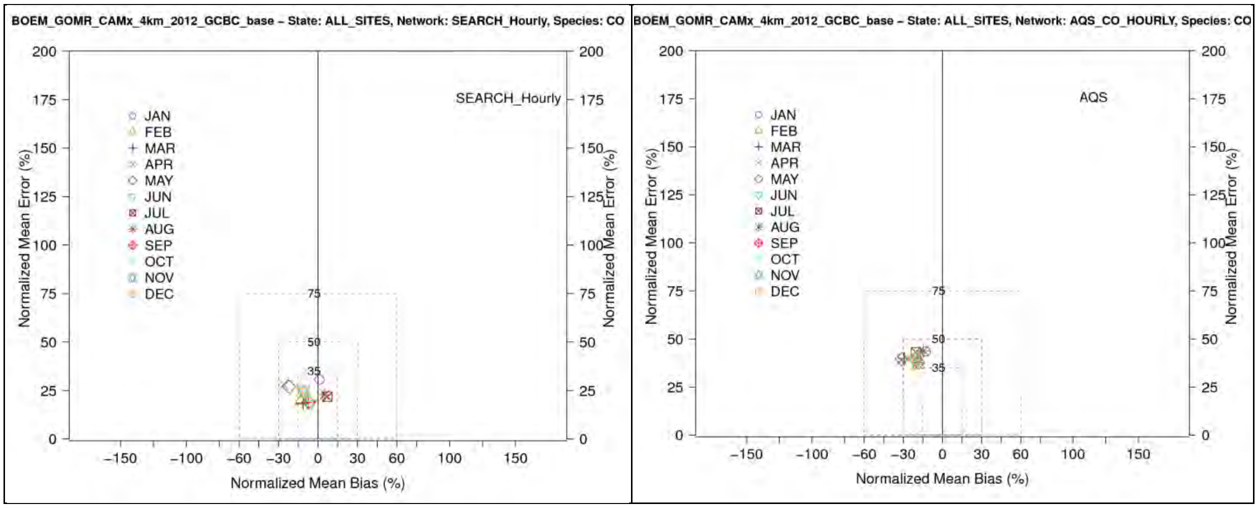


Figure H-38. Monthly Normalized Mean Bias and Normalized Mean Error for Hourly CO at SEARCH Network Sites (left) and AQS Sites (right).

H.6 AIR RESOURCE ASSESSMENT APPROACH

H.6.1 Future Year Modeling

The CAMx was run with the Future Year scenario emissions inventory, including emissions from the 2017-2022 GOM Multisale EIS sources described in **Appendix G**. Model results were post-processed for analysis of air quality impacts with respect to the NAAQS and AQRVs; PSD increments were also calculated for information purposes. Source apportionment technology was used to provide estimates of source group impacts, including impacts of potential new sources associated with the 2017-2022 GOM Multisale EIS. Details of the source apportionment and post-processing procedures are presented in this section.

H.6.1.1 Source Apportionment Design

The CAMx Ozone Source Apportionment Technology (OSAT) and Particulate Source Apportionment Technology (PSAT) tools were used to obtain the separate air quality, deposition, and visibility impacts associated with existing and new (2017-2022 GOM Multisale EIS) OCS oil and gas development in the GOM, as well as from other emission sources in the GOM and several other source categories as described in **Appendix G**. The CAMx OSAT and PSAT source apportionment tools use reactive tracers that operate in parallel to the host PGM to provide air quality and deposition contributions due to user-selected source groups. The CAMx determines the contributions of emissions from each source category to the total CAMx model concentrations and depositions during the course of the simulation. A detailed description of the CAMx source apportionment tools is available in the CAMx user's guide (ENVIRON, 2014).

The Anthropogenic Precursor Culpability Assessment (APCA) version of the CAMx Ozone Source Apportionment Technology (OSAT) was used in the future year scenario modeling. The APCA differs from OSAT in that it distinguishes between natural and anthropogenic emissions; when ozone is formed due to the interaction of biogenic VOC and anthropogenic NO_x under VOC-limited conditions, a case OSAT would assign the ozone formed to the biogenic VOC, APCA recognizes that biogenic VOC is uncontrollable and re-directs the ozone formed to the anthropogenic NO_x. Thus, APCA only assigns ozone formed to natural emissions when it is due to natural VOC interacting with natural NO_x emissions. The APCA requires that the first source category is always natural emissions. Like OSAT, APCA uses four reactive tracers to track the ozone contributions of each source group: NO_x emissions (Ni); VOC emissions (Vi);and ozone formed under VOC-limited (O_3Vi) and NO_x-limited (O_3Ni) conditions.

For PM, three families of Particulate Source Apportionment Technology (PSAT) source apportionment tracers were used to track contributions of SO_4, NO_3/NH_4, and primary PM that require, respectively, 2, 7 and 6 reactive tracers for each family. Thus, combined APCA/PSAT source apportionment uses 19 reactive tracers to track the contribution of each source category. The Secondary Organic Aerosol (SOA) family of PSAT tracers was not used in the future year scenario source apportionment modeling because (1) only a few specific kinds of VOC species form SOA (i.e., isoprene, terpenes, sesquiterpenes, and aromatics), and these VOCs are mainly emitted by biogenic sources with some aromatic species (e.g., toluene and xylene) emitted by anthropogenic sources (e.g., gasoline combustion) (emissions from oil and gas exploration and production has negligible aromatic VOC emissions); and (2) the chemistry of SOA is quite complex, involving numerous gaseous, semi-volatile, and particulate species so that PSAT requires 21 tracers to track the SOA contributions of each source group (Morris et al., 2015). As a result, including SOA would more than double the number of reactive tracers, resulting in doubling of the computer time needed for the CAMx source apportionment run.

H.6.1.2 Future Year Source Apportionment Simulation

The CAMx 2017 source apportionment simulation was conducted for 1 January to 31 December calendar year over the 12-km southeastern U.S. modeling domain shown in **Figure** H-5. The boundary conditions (BCs) defining inflow concentrations around the lateral boundaries of the 12-km domain were obtained from a future year CAMx simulation of the 36-km continental U.S. (CONUS) domain shown in **Figure H-5**. Both the 36-km and 12-km simulations made use of the same 2012 WRF meteorology and model configuration used in the base case simulation.

H.6.2 Post-Processing of Future Year Source Apportionment Modeling Results

H.6.2.1 Overview

The CAMx future year scenario model and ozone and particulate matter source apportionment modeling outputs were post-processed for comparison against the NAAQS and PSD concentration increments listed in **Table H-14** and other thresholds of concern (TOC), as discussed below. For analyzing NAAQS and AQRV impacts at Class I and sensitive Class II areas, the Thresholds of Concern (TOCs) used were as defined by the Federal Land Manager (FLM) that manages each Class I/II area as prescribed in the June 23, 2011, Memorandum of Understanding (MOU) for evaluating onshore oil and gas AQ/AQRV impacts.[17]

The CAMx source apportionment results for individual source categories were used to evaluate the incremental impacts of each of a set of hierarchical source groups as defined in **Table** H-15. Note that Source Group B represents all new direct emissions associated with the 2017-2022 GOM Multisale EIS and Source Group C represents these sources in addition to all existing OCS platforms and associated support vessel and aircraft activity. Also note that Source Group E includes Source Groups A-D, along with all other anthropogenic sources, but excludes fires and other natural sources (biogenics, lightning NO_x, sea salt) and the contribution of boundary conditions.

Table H-14. NAAQS and PSD Increments.

Pollutant	Pollutant/Averaging Time	NAAQS	PSD Class I Increment[1]	PSD Class II Increment[1]
CO	1-hour[2]	35 ppm 40,000 μg/m^3	--	--
CO	8-hour[2]	9 ppm 10,000 μg/m^3	--	--
NO_2	1-hour[3]	100 ppb 188 μg/m^3	--	--
NO_2	Annual[4]	53 ppb 100 μg/m^3	2.5 μg/m^3	25 μg/m^3
O_3	8-hour[5]	0.070 ppm 137 μg/m^3	--	--
PM_{10}	24-hour[6]	150 μg/m^3	8 μg/m^3	^{3}0 μg/m^3
PM_{10}	Annual[7]	--	4 μg/m^3	17 μg/m^3
$PM_{2.5}$	24-hour[8]	35 μg/m^3	2 μg/m^3	9 μg/m^3
$PM_{2.5}$	Annual[9]	12 μg/m^3	1 μg/m^3	4 μg/m^3
SO_2	1-hour10	75 ppb 196 μg/m^3		
SO_2	3-hour[11]	0.5 ppm 1,300 μg/m^3	25 μg/m^3	512 μg/m^3
SO_2	24-hour	--	5 μg/m^3	91 μg/m^3
SO_2	Annual[4]	--	2 μg/m^3	20 μg/m^3

[17] http://www.epa.gov/compliance/resources/policies/nepa/air-quality-analyses-mou-2011.pdf

Pollutant	Pollutant/Averaging Time	NAAQS	PSD Class I Increment[1]	PSD Class II Increment[1]

[1] The PSD demonstrations serve information purposes only and do not constitute a regulatory PSD increment consumption analysis.
[2] No more than one exceedance per calendar year.
[3] 98th percentile, averaged over 3 years.
[4] Annual mean not to be exceeded.
[5] Fourth-highest daily maximum 8-hour ozone concentrations in a year, averaged over 3 years, NAAQS promulgated December 28, 2015.
[6] Not to be exceeded more than once per calendar year on average over 3 years.
[7] 3-year average of the arithmetic means over a calendar year.
[8] 98th percentile, averaged over 3 years.
[9] Annual mean, averaged over 3 years, NAAQS promulgated December 14, 2012.
[10] 99th percentile of daily maximum 1-hour concentrations in a year, averaged over 3 years.
[11] No more than one exceedance per calendar year (secondary NAAQS).

Table H-15. Source Group for Incremental Impacts Analysis.

Source Group	Included Source Categories[a]	Comment
A	SC3	New oil and gas platform sources under the 2017-2022 GOM Multisale EIS scenario (w/Action)
B	SC3, SC4	Add support vessels and aircraft associated with new platform sources (w/Action)
C	SC3, SC4, SC5	Add oil and gas platforms and associated support vessels and aircraft under the No Action alternative (existing base case sources)
D	SC3, SC4, SC5, SC6	Add all other marine vessel activity in the GOM, not associated with OCS oil and gas activities
E	SC3, SC4, SC5, SC6, SC7, SC8	Add all other U.S. and non-U.S. anthropogenic sources
F	SC1, SC2, SC8, SC10	Natural and non-U.S. sources (including US sources outside of the 12-km modeling domain)

[a] Refer to **Table H-6**.

H.6.2.2 Comparison against NAAQS

The CAMx future year scenario predicted total concentrations from all emission sources were post-processed for comparison to the applicable NAAQS, as listed in **Table H-14**, in two different ways. First, the CAMx predictions were compared directly against each NAAQS. This is referred to as the "absolute" prediction comparison. These absolute prediction comparisons may be misleading in cases in which the model exhibits significant prediction bias. In recognition of this, USEPA modeling guidance (USEPA, 2007 and 2014) recommends using the model in a relative sense when projecting future year ozone, $PM_{2.5}$, and regional haze levels; and the USEPA has developed the Modeled Attainment Test Software (MATS; Abt. 2014) for making such future year projections. This approach uses the ratio of future year to current year modeling results to develop Relative Response Factors (RRFs) that are applied to observed current year Design Values (abbreviated as either DVC or DVB) to make future year Design Value (DVF) projections (i.e., DVF = DVC x RRF). The MATS was applied to the prediction of both ozone and $PM_{2.5}$ DVFs. The

MATS was also used for assessing the cumulative visibility impacts at IMPROVE monitoring sites in the 12-km domain, as discussed in more detail below.

H.6.2.3 Impacts at Class I and Sensitive Class II Areas

The incremental AQ/AQRV contributions associated with emissions from each source group listed in **Table H-15** were calculated at the Class I and sensitive Class II areas shown in **Figure** H-39. The selected areas include all Class I and sensitive Class II areas within the 4-km modeling domain plus additional Class I areas within the 12-km modeling domain.

Table H-16 lists those areas that are located in Gulf Coast or nearby states and thus are of greatest interest to this analysis. Refer to **Section** Error! Reference source not found. for a complete list of all areas shown in **Figure H-39**, along with the results of the visibility analyses.

Receptors for each Class I and sensitive Class II area were defined based on the spatial extent of the Class I/II area defined using shapefiles obtained from the applicable Federal Land Management Agency. A GIS was used to determine the set of grid cells overlapping each area by at least 5%. Model results for the identified grid cells were then used to represent predicted ambient concentrations and deposition in each area.

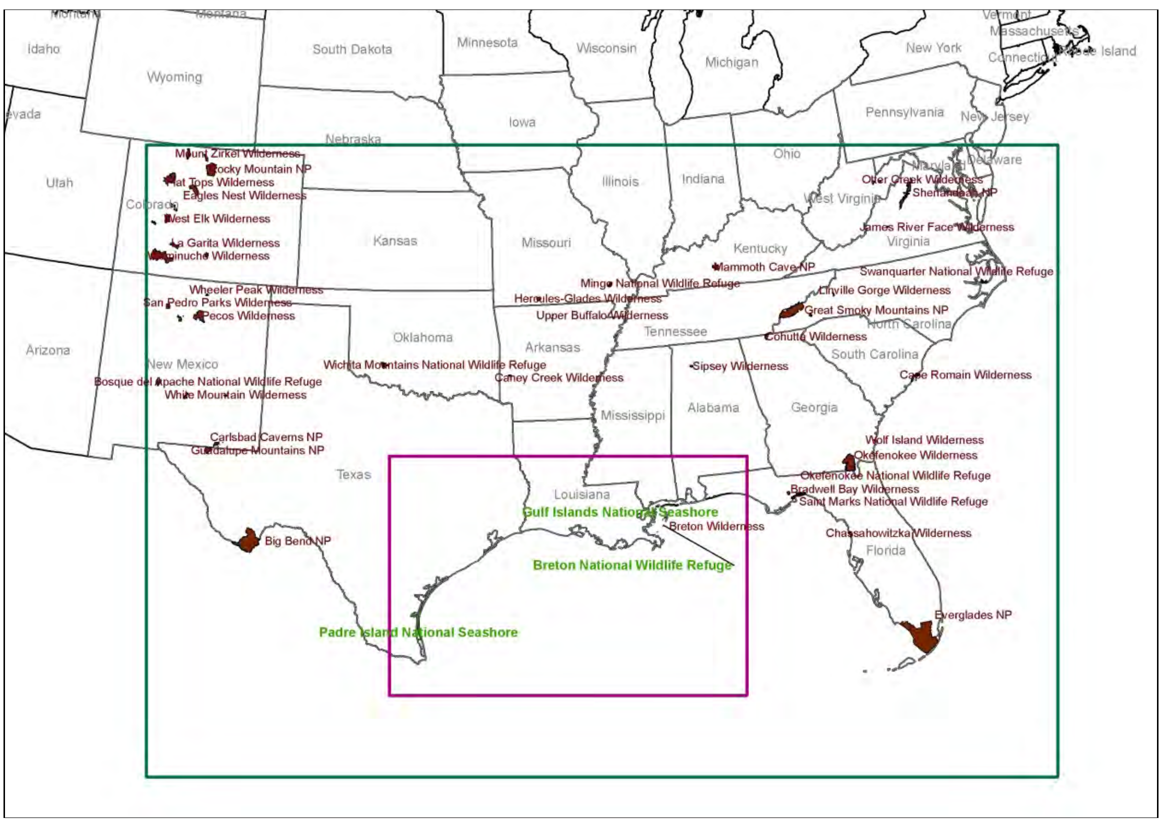


Figure H-39. Class I and Sensitive Class II Areas for Which Incremental AQ/AQRV Impacts Were Calculated.

Table H-16. Class I and Sensitive Class II Areas in Gulf Coast and Nearby States.

Type	Name	Agency[1]	State	Modeling Domain
Class I	Breton Wilderness	FWS	LA	4 km
Class II	Breton NWR	FWS	LA	4 km
Class II	Gulf Islands NS	NPS	MS, FL	4 km
Class II	Padre Island NS	NPS	TX	4 km
Class I	Bradwell Bay	FS	FL	12 km
Class I	St. Marks	FWS	FL	12 km
Class I	Chassahowitzka	FWS	FL	12 km
Class I	Everglades NP	NPS	FL	12 km
Class I	Okefenokee	FWS	GA	12 km
Class I	Wolf Island	FWS	GA	12 km
Class I	Cohutta	FS	GA	12 km
Class I	Sipsey	FS	AL	12 km
Class I	Guadalupe Mountains	NPS	TX	12 km
Class I	Big Bend	NPS	TX	12 km
Class I	Wichita Mountains	FWS	OK	12 km
Class I	Caney Creek	FS	AR	12 km
Class I	Upper Buffalo	FS	AR	12 km

[1] FWS = U.S. Dept. of the Interior, Fish and Wildlife Service; FS = U.S. Dept. of Agriculture, Forest Service; NPS = U.S. Dept. of the Interior, National Park Service; NS = National Seashore; NWR = National Wildlife Refuge.

H.6.2.3.1 Incremental Visibility Impacts

Visibility impacts were calculated for each source group using incremental concentrations as quantified by the CAMx PSAT tool. Changes in light extinction from CAMx model concentration increments due to emissions from each source group were calculated for each day at grid cells representing each Class I and sensitive Class II area. The FLAG (2010) procedures were used in the incremental visibility assessment analysis.

The visibility evaluation metric used in this analysis is based on the haze index (HI), which is measured in deciview (dv) units and is defined as follows:

$$HI = 10 \times \ln[b_{ext}/10]$$

Where b_{ext} is the atmospheric light extinction measured in inverse megameters (Mm^{-1}) and is calculated primarily from atmospheric concentrations of particulates.

A more intuitive measure of haze is visual range (VR), which is defined as the distance at which a large black object just disappears from view, and is measured in km. Visual range is related to b_{ext} by the formula $VR = 3912/b_{ext}$. The advantage of using the HI rather than VR is that a given change in HI is approximately associated with the same degree of <u>perceived</u> change in visibility regardless of the baseline conditions whereas small changes in VR are much more noticeable under clean conditions as compared to hazy conditions.

The incremental concentrations due to each source group were added to natural background extinction in the extinction equation (b_{ext}) and the difference between the haze index with the source group concentrations included and the haze index based solely on natural background concentrations is calculated. This quantity is the change in haze index, which is referred to as "delta deciview" (Δdv):

$$\Delta dv = 10 \times \ln[b_{ext(SC+background)}/10] - 10 \times \ln[b_{ext(background)}/10]$$
$$\Delta dv = 10 \times \ln[b_{ext(SC+background)}/b_{ext(background)}]$$

Here $b_{ext(SCi+background)}$ refers to atmospheric light extinction due to impacts from the source category plus background concentrations, and $b_{ext(background)}$ refers to atmospheric light extinction due to natural background concentrations only.

For each source group, the estimated visibility degradation at the Class I areas and sensitive Class II areas due to the source group are presented in terms of the number of days that exceed a threshold change in deciview (Δdv) relative to background conditions. The number of days with a deciview greater than 0.5 and 1.0 are reported.

IMPROVE Reconstructed Mass Extinction Equations

The FLAG (2010) procedures for evaluating visibility impacts at Class I areas use the revised IMPROVE reconstructed mass extinction equation to convert PM species in µg/m^3 to light extinction (b_{ext}) in inverse megameters (Mm^{-1}) as follows:

$$b_{ext} = b_{SO4} + b_{NO3} + b_{EC} + b_{OCM} + b_{Soil} + b_{PMC} + b_{SeaSalt} + b_{Rayleigh} + b_{NO2}$$

where

$b_{SO4} = 2.2 \times f_S(RH) \times$ [Small Sulfate] $+ 4.8 \times f_L(RH) \times$ [Large Sulfate]

$b_{NO3} = 2.4 \times f_S(RH) \times$ [Small Nitrate] $+ 5.1 \times f_L(RH) \times$ [Large Nitrate]

$b_{OCM} = 2.8 \times$ [Small Organic Mass] $+ 6.1 \times$ [Large Organic Mass]

$b_{EC} = 10 \times$ [Elemental Carbon]

$b_{Soil} = 1 \times$ [Fine Soil]

$b_{CM} = 0.6 \times$ [Coarse Mass]

$b_{SeaSalt} = 1.7 \times f_{SS}(RH) \times$ [Sea Salt]

$b_{Rayleigh}$ = Rayleigh Scattering (Site-specific)

$b_{NO2} = 0.33 \times [NO_2$ (ppb)] {or as: $0.1755 \times [NO_2$ (µg/m^3)]}.

f(RH) are relative humidity adjustment factors that account for the fact that sulfate, nitrate, and sea salt aerosols are hygroscopic and are more effective at scattering solar radiation at higher relative humidity. FLAG (2010) recommends using monthly average f(RH) values rather than the hourly averages recommended in the previous FLAG (2000) guidance document in order to moderate the effects of extreme weather events on the visibility results.

The revised IMPROVE equation treats "large sulfate" and "small sulfate" separately because large and small aerosols affect an incoming beam of light differently. However, the IMPROVE measurements do not separately measure large and small sulfate; they measure only the total $PM_{2.5}$ sulfate. Similarly, CAMx writes out a single concentration of particulate sulfate for each grid cell. Part of the definition of the new IMPROVE equation is a procedure for calculating the large and small sulfate contributions based on the magnitude of the model output sulfate concentrations; the procedure is documented in FLAG (2010).[18] The sulfate concentration magnitude is used as a surrogate for distinguishing between large and small sulfate concentrations. For a given grid cell, the large and small sulfate contributions are calculated from the model output sulfate (which is the "Total Sulfate" referred to in the FLAG [2010] guidance) as

For Total Sulfate $<20\ \mu g/m^3$:

$$[\text{Large Sulfate}] = ([\text{Total Sulfate}] / 20\ \mu g/m^3) \times [\text{Total Sulfate}]$$

For Total Sulfate $\geq 20\ \mu g/m^3$:

$$[\text{Large Sulfate}] = [\text{Total Sulfate}]$$

For all values of Total Sulfate:

$$[\text{Small Sulfate}] = [\text{Total Sulfate}] - [\text{Large Sulfate}]$$

The procedure is identical for nitrate and organic mass.

The PSAT source apportionment algorithm does not separately track NO_2 concentrations but instead tracks total reactive nitrogen (RGN) that consists of NO, NO_2, and other reactive nitrogen compounds (e.g., N_2O_5, HONO, etc.). Thus, for each hour and each grid cell representing a Class I/II area, a source group's incremental PSAT RGN contribution is converted to NO_2 by multiplying by the total (all emissions) CAMx model NO_2/RGN concentration ratio. Note that this same procedure is also used for contributions to NO_2 concentrations.

Although sodium and particulate chloride are treated in the CAMx core model, these species are not carried in the CAMx PSAT tool. This does not affect the calculations of visibility impacts from individual source groups other than impacts from the natural source category (SC2).

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[18] http://www.nature.nps.gov/air/Pubs/pdf/flag/FLAG_2010.pdf

Predicted daily average modeled concentrations due to each source group for receptor grid cells containing Class I and sensitive Class II areas were processed using the revised IMPROVE reconstructed mass extinction equation FLAG (2010) to obtain changes in bext at each sensitive receptor area that are converted to deciview and reported.

Annual average natural conditions for each Class I area were obtained from Table 6 in FLAG (2010) and monthly relative humidity factors for each Class I area from Tables 7-9 in FLAG (2010). The Δdv was calculated for each grid cell that overlaps a Class I or sensitive Class II area by 5% or more for each day of the annual CAMx run. The highest Δdv across all grid cells overlapping a Class I or sensitive Class II area by at least 5% was selected to represent the daily value at that Class I/II area. Visibility impacts due to emissions from each source group that exceed the 0.5 and 1.0 Δdv thresholds are noted.

Cumulative Visibility Impacts

The cumulative visibility impacts of the 2017-2022 GOM Multisale EIS were assessed following the recommendations from the U.S. Dept. of the Interior's Fish and Wildlife Service (FWS) and NPS (USDOI, FWS and USDOI, NPS, official communication, 2012). This approach is based on an abbreviated regional haze rule method that estimates the future year visibility at Class I and sensitive Class II areas for the average of the Worst 20% (W20%) and Best 20% (B20%) visibility days with and without the effects of the source group emissions on visibility impairment. The cumulative visibility impacts used CAMx model output from the 2012 Base Year and 2017 Future Year emissions scenarios in conjunction with monitoring data to produce cumulative visibility impacts at each Class I and sensitive Class II area. The USEPA's Modeled Attainment Test Software (MATS[19]) was used to make the 2017 visibility projections for the W20% and B20% days. The basic steps in the recommended cumulative visibility method are as follows (USDOI, FWS and USDOI, NPS, official communication, 2012):

(1) Calculate the observed average 2012 current year cumulative visibility impact using the haze index (HI, in deciviews) at each Class I area using representative IMPROVE measurement data to determine the 20% of days with the worst and 20% of days with the best visibility. The MATS is designed to use 5 years of monitoring data centered on the base case year, which for 2012 would include 2010-2014. However, MATS only includes IMPROVE monitoring data through 2012, so the 2008-2012 5-year period was used to define the visibility baseline conditions in the MATS visibility projections.

(2) Estimate the relative response factors (RRFs) for each component of $PM_{2.5}$ and for coarse mass (CM) corresponding to the new IMPROVE visibility algorithm using the CAMx 2012 and 2017 model output. The RRFs are based on the

[19] http://www.epa.gov/ttn/scram/modelingapps_mats.htm

average concentrations across a 3 x 3 array of 4-km grid cells centered on the IMPROVE monitoring site location.

(3) Using the RRFs and ambient data, calculate 2017 future year daily concentration data for the B20% and W20% days using the CAMx 2012 base case and 2017 standard model concentration estimates and PSAT source apportionment modeling results two ways:

   (a) 2017 Total Emissions: Use total 2017 CAMx concentration results due to all emissions;

   (b) 2017 No Cumulative Emissions: Use PSAT source apportionment results to eliminate contributions of PM concentrations associated with each source group.

(4) Use the information in Step 3 to calculate the average 2017 visibility for the 20% Best and 20% Worst visibility days and the 2017 emissions.

(5) Assess the average differences in cumulative visibility impacts for each source group and also compare with the future and current observed Baseline visibility conditions.

Because of the need for IMPROVE observations, monitoring data from nearby Class I areas were used to represent areas without any IMPROVE monitors.

H.6.2.3.2 Sulfur and Nitrogen Deposition

The CAMx-predicted wet and dry fluxes of sulfur- and nitrogen-containing species were processed to estimate total annual sulfur and nitrogen deposition values at each Class I and sensitive Class II area. The maximum annual sulfur and nitrogen deposition values from any grid cell that intersects a Class I receptor area was used to represent deposition for that area, in addition to the average annual deposition values of all grid cells that represent a Class I receptor area. Although the convention in the past has been to report just the maximum deposition in any receptor in a Class I/II area, since deposition relates to the total amount deposited across an entire watershed, the average metric may be considered a more relevant parameter for evaluating potential environmental effects. Maximum and average predicted sulfur and nitrogen deposition impacts are reported separately for each source group.

Nitrogen deposition impacts were calculated by taking the sum of the nitrogen contained in the fluxes of all nitrogen species modeled by the CAMx PSAT source apportionment tool. The CAMx species used in the nitrogen deposition flux calculation are reactive gaseous nitrate species, RGN (NO, NO_2, NO_3 radical, HONO, N_2O_5), TPN (PAN, PANX, PNA), organic nitrates (NTR), particulate nitrate formed from primary emissions plus secondarily formed particulate nitrate (NO_3), gaseous nitric acid (HNO_3), gaseous ammonia (NH_3), and particulate ammonium (NH_4). The CAMx species used in the sulfur deposition calculation are primarily sulfur dioxide emissions (SO_2) and particulate sulfate ion from primary emissions plus secondarily formed sulfate (SO_4).

FLAG (2010) recommends that applicable sources assess impacts of nitrogen and sulfur deposition at Class I areas. This guidance recognizes the importance of establishing critical deposition loading values ("critical loads") for each specific Class I area as these critical loads are completely dependent on local atmospheric, aquatic, and terrestrial conditions and chemistry. Critical load thresholds are essentially a level of atmospheric pollutant deposition below which negative ecosystem effects are not likely to occur. FLAG (2010) does not include any critical load levels for specific Class I areas and refers to site-specific critical load information on FLM websites for each area of concern. This guidance does, however recommend the use of deposition analysis thresholds (DATs [20]) developed by the NPS and FWS. The DATs represent screening level values for nitrogen and sulfur deposition for individual projects with deposition impacts below the DATS considered negligible. A DAT of 0.005 kilograms per hectare per year (kg/ha/yr) for both nitrogen and sulfur deposition has been established for both nitrogen and sulfur deposition in western Class I areas. A DAT of 0.01 kg/ha/yr has been established for both nitrogen and sulfur deposition for areas in the eastern U.S. As a screening analysis, results for Source Group B (new platforms and associated support vessels and aircraft associated with the 2017-2022 GOM Multisale EIS scenario) were compared to the DATs. Comparison of deposition impacts from cumulative sources to the DAT is not appropriate.

For the 2012 base case and the combined source groups and total 2012 and future year emissions, the annual nitrogen and sulfur deposition were compared against critical load values established by the Federal Land Management agencies. Published nitrogen critical load values for areas managed by the NPS[21] include minimum critical loads of 3 kg/ha/yr at the Gulf Islands National Seashore, as well as at Guadalupe Mountains and Big Bend, and 5 kg/ha/yr at Padre Island National Seashore and Everglades National Park. These values represent the minimum of the critical loads for each biological community type (i.e., forests, herbaceous plants, lichen, mycorrhizal fungi, and nitrate leaching). Nitrogen and sulfur critical load values for areas managed by the U.S. Dept. of Agriculture's Forest Service (USFS) include 5 kg/ha/yr at Bradwell Bay, Cohutta, Sipsey, Caney Creek and Upper Buffalo. The 5 kg/ha/yr critical load value for these areas applies separately to nitrogen and to sulfur deposition. As no separate critical load values for sulfur are available from the NPS areas, the sulfur critical loads were set equal to the values for nitrogen. No published critical load values were found for areas managed by the FWS; critical loads for these areas were set by reference to the NPS and USFS critical loads based on proximity and similarity of ecoregion types. Using this approach, both nitrogen and sulfur critical loads for the Breton Wilderness, Breton National Wildlife Refuge, St. Marks, Chassahowitzka, Okefenoke, and Wolf Island were set at 3 kg/ha/yr based on the Gulf Islands National Seashore value for Eastern Temperate Forests. The values for Wichita Mountains was set at 5 kg/ha/yr based on the NPS' Chickasaw National Recreation Area Great Plains ecoregion value.

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[20] http://www.nature.nps.gov/air/Pubs/pdf/flag/nsDATGuidance.pdf
[21] http://www.nature.nps.gov/air/Studies/criticalloads/Ecoregions/index.cfm

H.6.2.4 PSD Increments

The maximum contribution of new oil and gas emissions in the Gulf of Mexico under the 2017-2022 GOM Multisale EIS scenario were reported for each Class I and sensitive Class II area and were compared against the PSD increments given in **Table H-14**. Under the Clean Air Act, a PSD increment consumption analysis requires major stationary sources subject to PSD review to demonstrate that emission increases from the proposed source, in conjunction with all other emissions increases or reductions in the impacted area (typically within 50 kilometers), will not cause or contribute to concentrations of air pollutants that exceed PSD increments. The PSD increments have been established for NO_x, SO_2, and PM in Class I and Class II areas. Actions to be authorized by BOEM under the 2017-2022 GOM Multisale EIS scenario do not typically constitute major stationary sources and do not typically trigger PSD permits or review. However, a comparison of ambient concentrations from an accumulation of new oil and gas sources within the entire study area to PSD increments at specific Class I and Class II areas is included in this analysis for information purposes. This information is presented to aid State agencies in tracking the potential minor source increment consumption and to aid Federal Land Managers or Tribal governments responsible for protecting air resources in Class I areas.

H.7 AIR RESOURCE ASSESSMENT RESULTS

H.7.1 NAAQS Impacts

Future year CAMx modeling results were used to examine future air quality relative to the NAAQS and the individual contributions of each source group relative to the NAAQS. For the ozone and $PM_{2.5}$ NAAQS, comparisons are presented both in terms of the “absolute” CAMx results and in terms of using the base case and future year CAMx results in a relative sense to scale the observed base (“current” or “base”) year design value (DVC or DVB) to obtain the projected future year design value (DVF) as recommended by the USEPA’s modeling guideline (USEPA, 2007 and 2014) and as described in **Section H.6.2.2.**

H.7.1.1 Ozone NAAQS Analysis using Relative Model Results

The USEPA’s Model Attainment Test Software (MATS) was used to make future year ozone DVF projections using the CAMx 2012 base case and future year scenario modeling results as described in **Section H.6.2.2**. The MATS was used to make DVF projections at the locations of ambient air monitoring sites as well as throughout the 4-km modeling domain using the MATS Unmonitored Area Analysis (UAA) procedures.

H.7.1.1.1 Monitored Ozone Design Value Projections using MATS

The MATS results for the future year ozone design values (DVFs) at individual ambient air monitoring sites in the 4-km domain are listed in **Table H-17 andTable** H-18. Updated MATS data files containing ozone design values up through 2014 were obtained from the USEPA.[22] To make future year projections, MATS starts with a current year design value (DVC) that is based on an average of three ozone design values from the 5-year period centered on the base case modeling year, which was 2012 for this analysis. Thus, MATS DVCs are based on ozone design values from the 2010-2012, 2011-2013, and 2012-2014 periods. The MATS makes ozone DVF projections using the changes in daily maximum 8-hour ozone concentrations near (3 x 3 array of 4-km grid cells) a monitor using the ratio of future year to current year modeling results to scale the observed DVCs. These modeled derived scaling factors are called Relative Response Factors (RRFs; DVF = DVC x RRF). The RRFs are based on the 10 highest modeled ozone days above a threshold ozone concentration. A lower bound observed ozone threshold value of 50 ppb was used in MATS.

Of the 74 monitors with valid DVCs as calculated by MATS, 39 have DVCs exceeding the NAAQS (70 ppb). The DVFs are less than DVCs at all 74 sites. A total of 22 sites have predicted DVFs exceeding the MATS, all of which are among the sites with DVCs above the NAAQS.

Contributions of each source group to the DVFs were calculated as the difference between the DVF calculated from the CAMx results with all sources included and a revised DVF calculated after first subtracting out the individual hourly contributions of each source group in the future year model run. These source group contributions are tabulated in **Table H-18**. The maximum contribution from Source Group A (new platforms associated with the 2017-2022 GOM Multisale EIS scenario) is 0.5 ppb. The maximum contribution from Source Group B (new platforms and support vessels and helicopters associated with this Multisale EIS scenario) is 5.1 ppb.

Five sites in Texas and one in Louisiana were identified where the contribution of the new platforms and associated support vessels and aircraft under the 2017-2022 GOM Multisale EIS scenario (Source Group B) to the DVF was enough to push the DVF from just below the 70 ppb NAAQS (with Source Group B contributions removed) to just above the NAAQS when all sources were included (**Table H-19**). In each case, the "contribution" from Source Group B is less than 5 ppb. At each of these sites, the DVCs are all also greater than 70 ppb as noted above. At the Galveston, Texas, monitor, the 0.3-ppb contribution of Source Group A (new platforms) alone was sufficient to bump the future year design value from just below the NAAQS to just above the NAAQS (recall comparisons to the 70 ppb NAAQS are made after truncating design values to the nearest ppb).

For the ozone impacts assessment, please note that the states will not designate under the 2015 ozone standard of 70 ppb until 2017, with the earliest attainment date of March 2021 for marginal areas. For this impacts assessment, the non-OCS source emissions were based on the USEPA's 2017 emission projections, with a future modeled year of 2017 and compared to the 70-ppb standard. This assessment is assuming the standard will be attained way before the actual

[22] https://www3.epa.gov/scram001/modelingapps_mats.htm

attainment date, but it wanted to give maximum OCS oil and gas impacts under the new 70ppb ozone standard.

Table H-17. Current Year (DVC) and Future Year (DVF) Ozone Design Values at Ambient Air Monitoring Sites within the 4-km Modeling Domain from MATS.

Site ID	Site Name	State	County	DVC	DVF
10030010	FAIRHOPE HIGH SCHOOL, FAIRHOPE, ALABAMA	AL	Baldwin County	68	66.2
10970003	CHICKASAW, MOBILE CO., ALABAMA	AL	Mobile County	67.3	64.4
10972005	BAY RD. ,MOBILE AL.	AL	Mobile County	72	66.5
120330004	ELLYSON INDUSTRIAL PARK-COPTER ROAD	FL	Escambia County	67.7	65.1
120330018	NAS PENSACOLA	FL	Escambia County	70.7	68.1
120910002	720 Lovejoy Rd	FL	Okaloosa County	65	62.9
121130015	1500 WOODLAWN WAY	FL	Santa Rosa County	69.3	67.4
220050004	11153 Kling Road	LA	Ascension Parish	71.3	67.8
220190002	HIGHWAY 27 AND HIGHWAY 108	LA	Calcasieu Parish	70.7	68.9
220190008	2646 John Stine Road	LA	Calcasieu Parish	66.7	64.7
220190009	2284 Paul Bellow Road	LA	Calcasieu Parish	70	67.3
220330003	EAST END OF ASTER LANE	LA	East Baton Rouge Parish	75.3	71.3
220330009	1061-A Leesville Ave	LA	East Baton Rouge Parish	72.3	68.3
220330013	11245 Port Hudson-Pride Rd. Zachary, La	LA	East Baton Rouge Parish	69	65.1
220470009	65180 Belleview Road	LA	Iberville Parish	70.3	64.6
220470012	HIGHWAY 171, CARVILLE	LA	Iberville Parish	73.3	68.6
220511001	West Temple Pl	LA	Jefferson Parish	71.3	68.4
220550007	646 Cajundome	LA	Lafayette Parish	69.7	67.2
220570004	Nicholls University Farm Highway 1	LA	Lafourche Parish	71	65.7
220630002	Highway 16, French Settlement	LA	Livingston Parish	72.3	68.6
220710012	Corner of Florida Ave & Orleans Ave	LA	Orleans Parish	68.3	66.5
220770001	TED DAVIS RESIDENCE. HIGHWAY 415	LA	Pointe Coupee Parish	74	68.2
220870004	4101 Mistrot Dr. Meraux, LA 70075	LA	St. Bernard Parish	68	64.4
220890003	1 RIVER PARK DRIVE	LA	St. Charles Parish	67.7	65.2
220930002	ST. JAMES COURTHOUSE, HWY 44 @ CANAPELLA	LA	St. James Parish	66.3	62.7
220950002	Anthony F. Monica Street	LA	St. John the Baptist Parish	72	69.3
221030002	1421 Hwy 22 W, Madison Ville, LA 70447	LA	St. Tammany Parish	72.3	68.7
221210001	1005 Northwest Drive, Port Allen	LA	West Baton Rouge Parish	68	63.8
280450003	400 Baltic St	MS	Hancock County	66.3	63.4
280470008	47 Maple Street	MS	Harrison County	70.3	67
280590006	Hospital Road at Co. Health Dept.	MS	Jackson County	71.3	69.2

Site ID	Site Name	State	County	DVC	DVF
480271047	1605 Stone Tree Drive	TX	Bell County	73.7	71
				80.3	78
				68.7	66.3
480391004	4503 CROIX PKWY	TX	Brazoria County	85	81.9
480391016	109 B BRAZORIA HWY 332 WEST	TX	Brazoria County	69.3	66.8
480610006	344 PORTER DRIVE	TX	Cameron County	60.7	59.2
				69.3	66.6
481671034	9511 AVENUE V ½	TX	Galveston County	75.3	71.2
482010024	4510 1/2 ALDINE MAIL RD.	TX	Harris County	76.7	75.1
482010026	1405 SHELDON ROAD	TX	Harris County	73	71.2
482010029	16822 KITZMAN	TX	Harris County	80	76.3
482010046	7330 1/2 NORTH WAYSIDE	TX	Harris County	73.7	71.6
482010047	4401 1/2 LANG RD.	TX	Harris County	77	74.8
482010051	13826 1/2 CROQUET	TX	Harris County	78.7	76.3
482010055	6400 BISSONNET STREET	TX	Harris County	78.7	77.3
482010062	9726 1/2 MONROE	TX	Harris County	76.7	74.4
482010066	3333 1/2 HWY 6 SOUTH	TX	Harris County	77.7	75.2
482010070	5425 POLK AVE., SUITE H	TX	Harris County	75	73.5
482010416	7421 PARK PLACE BLVD	TX	Harris County	77.3	74.8
482011015	1001 B LYNCHBURG ROAD	TX	Harris County	71	68.5
482011034	1262 1/2 MAE DRIVE	TX	Harris County	78	76.1
482011035	9525 CLINTON DR	TX	Harris County	74.7	72.5
482011039	4514 1/2 DURANT ST.	TX	Harris County	78.3	75.5
482011050	4522 PARK RD.	TX	Harris County	76.3	74
482151048	325 Golf Course Road	TX	Hidalgo County	60	58.1
482450009	1086 Vermont Avenue	TX	Jefferson County	71.7	68.3
482450011	800 EL VISTA ROAD & 53RD STREET	TX	Jefferson County	74	70.5
482450022	12552 SECOND ST.	TX	Jefferson County	70.3	66.7
482450101	6019 MECHANIC	TX	Jefferson County	75	72.3
482450102	SETRPC 43 Jefferson Co Airport	TX	Jefferson County	67	64.4
482450628	UNAVAILABLE	TX	Jefferson County	69.3	66.4
482451035	Seattle Street	TX	Jefferson County	69.3	66.9
483091037	4472 MAZANEC RD	TX	McLennan County	71.7	69.1
483390078	9472 A HWY 1484	TX	Montgomery County	78	74.7
483491051	Corsicana Airport	TX	Navarro County	70	68.2
483550025	CORPUS CHRISTI STATE SCHOOL, AIRPORT RD	TX	Nueces County	69.3	68.2
483550026	9860 LA BRANCH	TX	Nueces County	68.3	66.2
483611001	2700 AUSTIN AVE	TX	Orange County	69.3	66.5
483611100	INTERSECTION OF TX HWYS 62 AND 12	TX	Orange County	68	65.4
484530014	3724 NORTH HILLS DR, AUSTIN, TX 78758	TX	Travis County	71.3	67.7
484530020	12200 LIME CREEK RD.	TX	Travis County	71.7	68.3
484690003	106 MOCKINGBIRD LANE	TX	Victoria County	66.3	64.2

Table H-18. Ozone Current (DVC) and Future Year (DVF) Design Values and Reduction in DVF with Contributions from Individual Source Groups Removed.

Site id	State	County	DVC	DVF	Change in DVF with Source Group Removed				
					A	B	C	D	E
10030010	AL	Baldwin County	68	66.2	0.3	4.7	7.6	10.2	42.6
10970003	AL	Mobile County	67.3	64.4	0.1	2.3	4.2	5.4	40.4
10972005	AL	Mobile County	72	66.5	0.1	5.1	6.5	7.9	44.7
120330004	FL	Escambia County	67.7	65.1	0.3	1.7	5.5	7.4	35.3
120330018	FL	Escambia County	70.7	68.1	0.4	2.6	7.8	10.9	37.8
120910002	FL	Okaloosa County	65	62.9	0.3	1.9	6.8	9.5	33.6
121130015	FL	Santa Rosa County	69.3	67.4	0.5	2.6	9.3	12.7	37.5
220050004	LA	Ascension Parish	71.3	67.8	0.1	0.7	2.3	3.1	43.6
220190002	LA	Calcasieu Parish	70.7	68.9	0.3	2	5.6	8.3	40.2
220190008	LA	Calcasieu Parish	66.7	64.7	0.3	1.7	4.9	7.4	37.6
220190009	LA	Calcasieu Parish	70	67.3	0.2	1.5	4.2	6.1	39.7
220330003	LA	East Baton Rouge Parish	75.3	71.3	0.1	0.7	2.9	4	45.3
220330009	LA	East Baton Rouge Parish	72.3	68.3	0.1	0.7	2.6	3.7	43.3
220330013	LA	East Baton Rouge Parish	69	65.1	0.2	1	3.2	4.3	37.7
220470009	LA	Iberville Parish	70.3	64.6	0	0.2	0.7	1.1	41.2
220470012	LA	Iberville Parish	73.3	68.6	0	0.4	1.5	2.3	45.7
220511001	LA	Jefferson Parish	71.3	68.4	0.2	1.1	5.2	6.6	45
220550007	LA	Lafayette Parish	69.7	67.2	0.1	1.4	3.9	5.6	41.5
220570004	LA	Lafourche Parish	71	65.7	0.1	0.5	1.7	2.4	40.9
220630002	LA	Livingston Parish	72.3	68.6	0.2	1.1	4.4	5.9	44.3
220710012	LA	Orleans Parish	68.3	66.5	0.3	1.2	5.6	7.2	42
220770001	LA	Pointe Coupee Parish	74	68.2	0	0.5	2	3	43.7
220870004	LA	St. Bernard Parish	68	64.4	0.3	1.4	5.5	7.2	41.1
220890003	LA	St. Charles Parish	67.7	65.2	0.1	0.6	2.5	3.3	44.7
220930002	LA	St. James Parish	66.3	62.7	0.1	0.5	2.1	2.8	39.3
220950002	LA	St. John the Baptist Parish	72	69.3	0.2	0.9	3.5	4.6	45
221030002	LA	St. Tammany Parish	72.3	68.7	0.2	1.1	5	6.3	42.9
221210001	LA	West Baton Rouge Parish	68	63.8	0	0.5	2.1	2.9	40
280450003	MS	Hancock County	66.3	63.4	0.3	1.6	5.3	7.1	39.9
280470008	MS	Harrison County	70.3	67	0.3	1.7	5.4	7.3	42.8
280590006	MS	Jackson County	71.3	69.2	0.4	2.7	6	8.9	44.9
480271047	TX	Bell County	73.7	71	0	0.3	0.9	1.2	30.9
			80.3	78	0	0.3	0.9	1.3	37.4
			68.7	66.3	0.1	0.2	0.4	0.5	33.3
480391004	TX	Brazoria County	85	81.9	0.1	0.7	2.2	3.1	49.5
480391016	TX	Brazoria County	69.3	66.8	0.2	1.3	3.4	4.8	37.4
480610006	TX	Cameron County	60.7	59.2	0.2	1.3	2.4	3.3	29.2
			69.3	66.6	0.1	0.2	0.3	0.5	29.9

Site id	State	County	DVC	DVF	Change in DVF with Source Group Removed				
					A	B	C	D	E
481671034	TX	Galveston County	75.3	71.2	0.3	3.6	9.8	16.6	46.6
482010024	TX	Harris County	76.7	75.1	0.2	1.5	4	5.8	44.1
482010026	TX	Harris County	73	71.2	0.2	1.6	4.1	5.9	42.1
482010029	TX	Harris County	80	76.3	0.2	1.1	3.3	4.8	48
482010046	TX	Harris County	73.7	71.6	0.2	1.3	3.4	4.9	41.8
482010047	TX	Harris County	77	74.8	0.2	1	3	4.4	46
482010051	TX	Harris County	78.7	76.3	0.1	0.6	1.8	2.6	47.5
482010055	TX	Harris County	78.7	77.3	0.1	0.8	2.4	3.3	46.9
482010062	TX	Harris County	76.7	74.4	0.2	1.1	3.1	4.5	45.3
482010066	TX	Harris County	77.7	75.2	0.1	0.7	2.2	3.1	46.6
482010070	TX	Harris County	75	73.5	0.2	1.3	3.4	5	41.6
482010416	TX	Harris County	77.3	74.8	0.1	1.2	3.1	4.6	44.4
482011015	TX	Harris County	71	68.5	0.2	1.3	3.7	5.3	39.1
482011034	TX	Harris County	78	76.1	0.3	1.7	4.1	5.9	44.3
482011035	TX	Harris County	74.7	72.5	0.2	1.3	3.3	5	41.7
482011039	TX	Harris County	78.3	75.5	0.2	1.3	3.4	5.1	42.8
482011050	TX	Harris County	76.3	74	0.3	2.2	5.8	9.1	43.5
					0.1	0.6	1.5	2.2	27.5
482151048	TX	Hidalgo County	60	58.1	0.1	0.6	1.4	2	24.3
482450009	TX	Jefferson County	71.7	68.3	0.1	0.7	2	2.9	42.2
482450011	TX	Jefferson County	74	70.5	0.2	1.9	4.9	7.2	43.9
482450022	TX	Jefferson County	70.3	66.7	0.1	0.8	2.4	3.5	40.3
482450101	TX	Jefferson County	75	72.3	0.3	3	8.2	12.4	45.9
482450102	TX	Jefferson County	67	64.4	0.2	1.3	4.1	6	40
482450628	TX	Jefferson County	69.3	66.4	0.2	2	5.3	7.8	41.8
482451035	TX	Jefferson County	69.3	66.9	0.2	1.5	4.5	6.7	41.9
483091037	TX	McLennan County	71.7	69.1	0	0.2	0.5	0.7	31.3
483390078	TX	Montgomery County	78	74.7	0.2	1	3.1	4.5	45.8
483491051	TX	Navarro County	70	68.2	0.1	0.2	0.6	0.8	33.5
483550025	TX	Nueces County	69.3	68.2	0.3	1.9	5.4	7.4	35
483550026	TX	Nueces County	68.3	66.2	0.3	1.3	3.6	4.9	32.7
483611001	TX	Orange County	69.3	66.5	0.1	1.4	4.8	6.9	41.3
483611100	TX	Orange County	68	65.4	0.1	1.5	4.6	6.9	40
484530014	TX	Travis County	71.3	67.7	0	0.2	0.9	1.3	37.5
484530020	TX	Travis County	71.7	68.3	0.1	0.3	1	1.4	35.8
484690003	TX	Victoria County	66.3	64.2	0.2	1	3	4.2	32.6

Table H-19. MATS Ozone Design Value Results for All Monitoring Sites Where Exclusion of Contributions from Source Group A or B is Sufficient to Reduce the Predicted Future Design Value (DVF) from Above the NAAQS to Below the NAAQS (all values in ppb).

Site ID	Location	State	DVC[1]	DVF[2]	DVF_A[3]	DVF – DVF_A	DVF_B[3]	DVF – DVF_B
220330003	East Baton Rouge Parish	LA	75.3	71.3	71.2	0.1	70.6	0.7
480271047	Bell County	TX	73.7	71.0	71.0	0.0	70.7	0.3
481671034	Galveston	TX	75.3	71.2	70.9	0.3	69.1	4.9
482010026	Houston	TX	73	71.2	71.0	0.2	69.6	1.6
482010046	Houston	TX	73.7	71.6	71.4	0.2	70.3	1.3
482450101	Port Arthur	TX	75	72.3	72.0	0.3	69.3	3.0

[1] The MATS base period ozone design value (ppb) representing combined contributions of all sources.
[2] The MATS future year ozone design value (ppb) representing combined contributions of all sources.
[3] The MATS future year ozone design value (ppb) calculated after removing source apportionment contributions of Source Group A or B.

Figure H-40 displays the MATS Unmonitored Area Analysis (UAA) results, which were generated using the observed ozone data in MATS and the base year and future year scenario CAMx results. The MATS UAA spatially interpolates the DVCs obtained from observations across the modeling domain and then calculates the DVF for each model grid cell by multiplying the interpolated DVC by the RRF value (i.e., the ratio of the modeled future year to base year design values) in each grid cell. Future year design values calculated using the MATS UAA procedure are lower than base year design values throughout most of the 4-km modeling domain with the exception of a maximum 1.6-ppb increase of less than 3 ppb off the Louisiana coast.

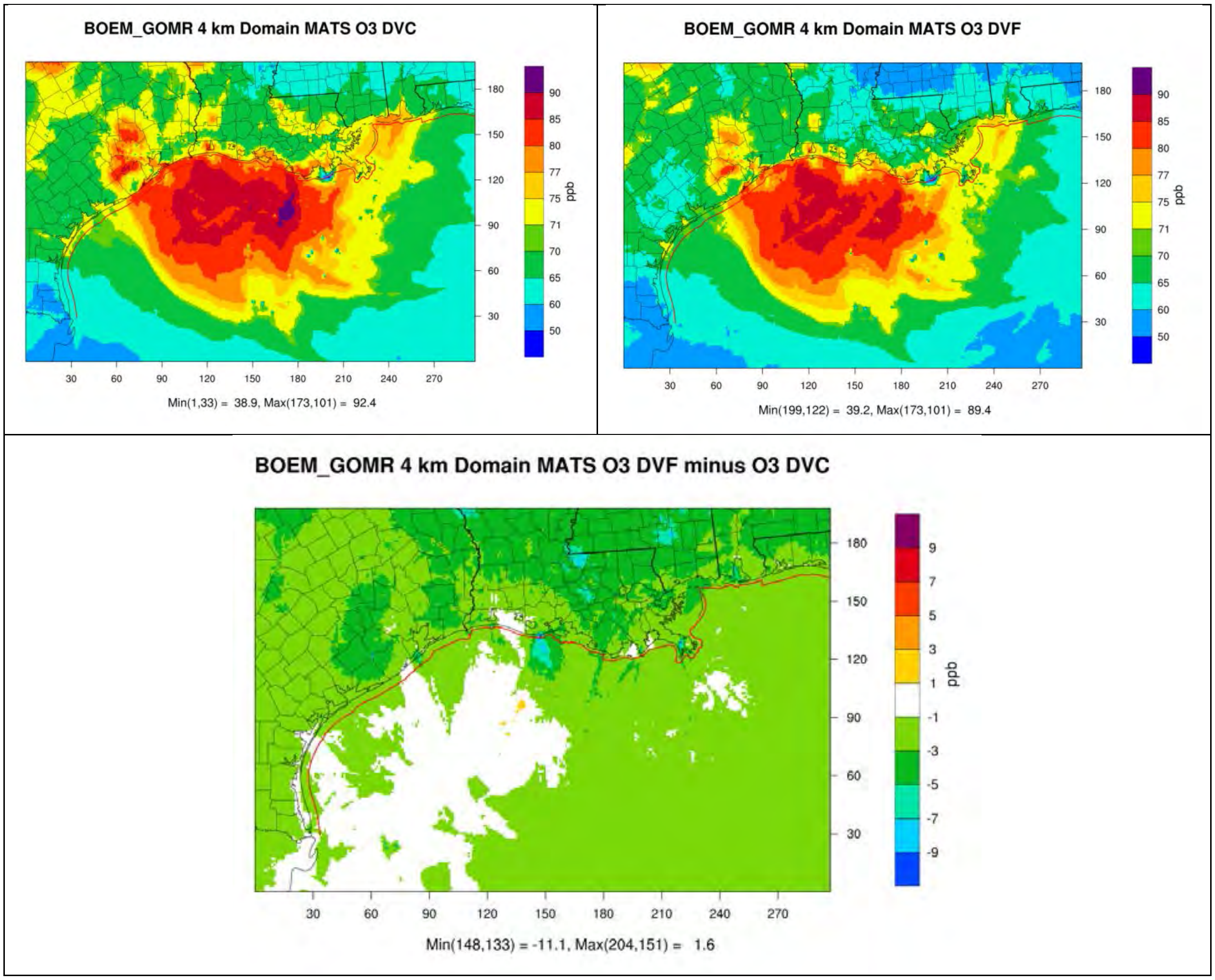
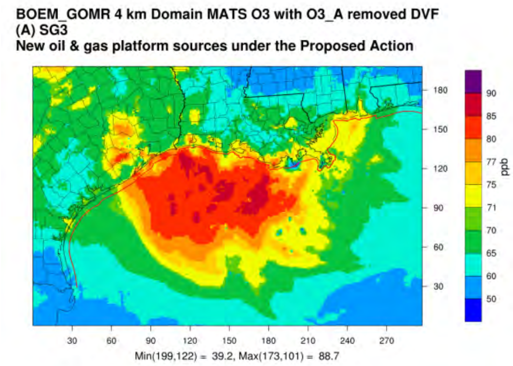
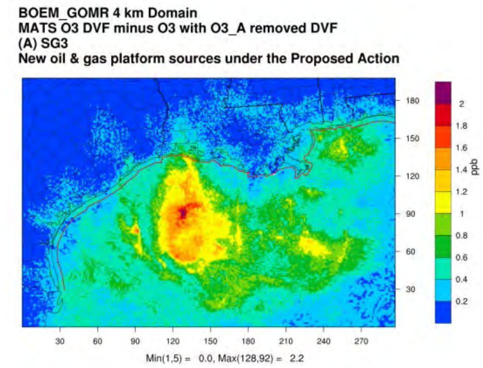
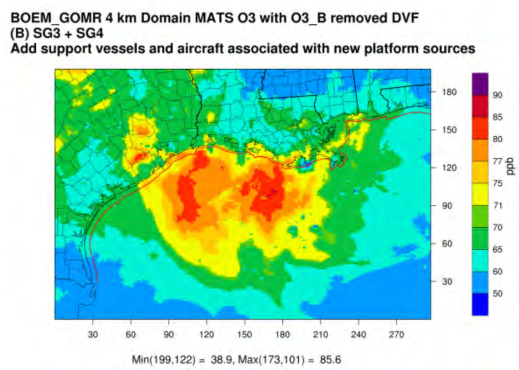
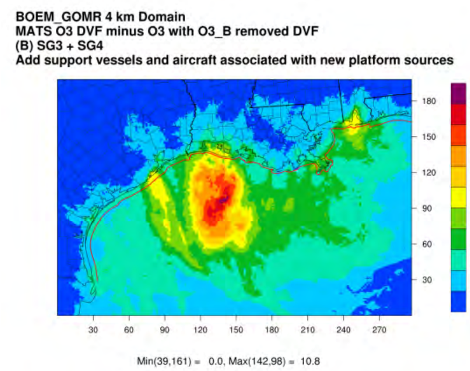
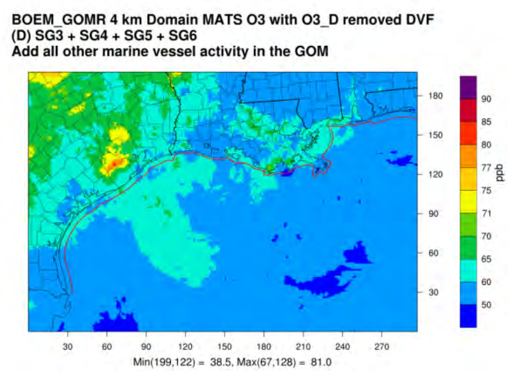
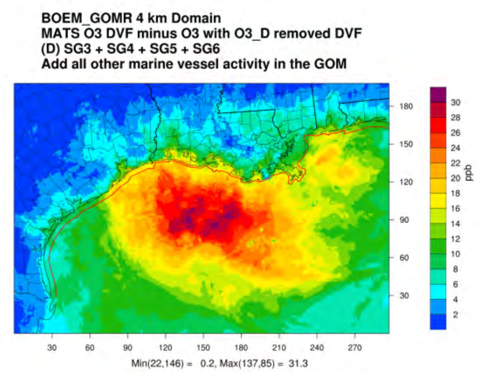


Figure H-40. Base Scenario Ozone Design Values (DVC, top left), Future Year Ozone Design Values (DVF, top right) and Their Differences (DVF – DVC; bottom) Calculated Using the MATS UAA Tool.

H.7.1.1.2 Ozone MATS Unmonitored Area Analysis

The MATS UAA DVF values calculated after first removing the hourly contributions from Source Groups A (new platforms), B (new platforms and associated support vessels and aircraft), and D (all Gulf of Mexico sources) are shown in the left column of **Figure H-41**. The contributions of Source Groups A, B, and D calculated as the difference between these DVF values and the DVF values from all sources (as shown in the upper right-hand corner of **Figure H-40**) are shown in the right column of **Figure H-41**. Source Group A contributions are centered in the Gulf of Mexico offshore of Louisiana, with a peak impact of 2.2 ppb; maximum impacts from the State seaward boundaries inland are in the 1- to 1.2-ppb range along the coast of Cameron Parish. For Source Group B, the maximum contribution (10.8 ppb) is in approximately the same location, but the support vessel and helicopter activities result in greater impacts landward of the State seaward boundary, with maximum contributions in the 6- to 7-ppb range.

<table>
<tr><th>Source Group[1]</th><th>DVF with Source Group Contribution Removed</th><th>Source Group Contribution[2]</th></tr>
<tr><td>A</td><td>
</td><td>
</td></tr>
<tr><td>B</td><td>
</td><td>
</td></tr>
<tr><td>D</td><td>
</td><td>
</td></tr>
</table>

[1] As defined in **Table H-14**.

[2] Source group contributions are calculated by subtracting the DVF values calculated after removing the hourly source group contributions from the DVF values calculated when all sources are included.

Figure H-41. MATS UAA Future Year Ozone Design Values (DFV) Calculated After First Removing the Hourly Contributions from a Source Group (left column) and the Corresponding Contributions of the Source Group to DVF (right column) Calculated by Subtracting the DVFs Shown in the Left-hand Column from the "All Sources" DVF Shown in the Top Right-hand Corner of ***Figure H-40****. Top row – source group B; middle row – source group D.*

H.7.1.2 Ozone NAAQS Analysis Using Absolute Modeling Results

The CAMx source apportionment absolute modeling results from the future year scenario are analyzed and compared with the ozone NAAQS in this section. The ozone NAAQS is defined as the 3-year average of the 4th highest maximum daily average 8-hour (MDA_8) ozone concentration. Since only one calendar year of modeling results are available for the base year and future year scenarios, the future year 4th highest MDA_8 ozone concentration is used as a pseudo-NAAQS comparison metric.

Modeled 4th highest MDA_8 values in each model grid cell for the base and future year scenarios and the corresponding differences are shown in **Figure H-42**. Similar to the MATS results presented in **Figure H-40**, the 4th highest MDA_8 is lower under the future year scenario throughout most of the 4-km domain, with isolated areas of increases of less than 4 ppb located off the coasts of Louisiana and Texas and onshore in Cameron Parish, Louisiana.

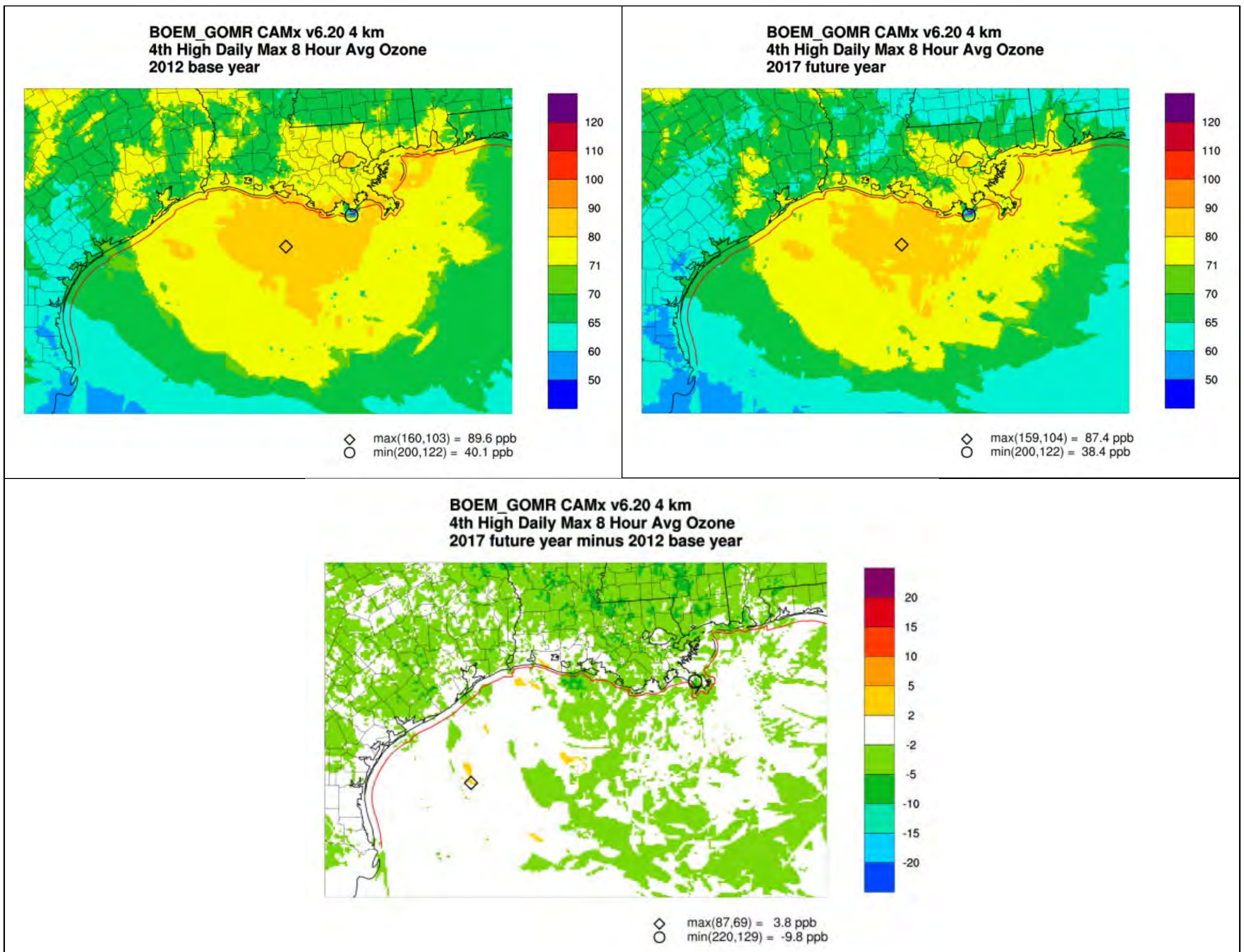


Figure H-42. Modeled 4th Highest MDA_8 Ozone for the Base Year (upper left) and Future Year (upper right) Scenarios and Their Differences (bottom center).

Contributions of each source group to the all sources future year 4th highest MDA_8 values shown in the upper right-hand panel of **Figure H-42** are shown in **Figure H-43 and Figure** H-44. These contributions are matched in time to the all sources 4th highest MDA_8 values; contributions may be different during other periods with elevated MDA_8 values. As shown in **Figure H-43**, new platform sources under the 2017-2022 GOM Multisale EIS scenario (Source Group A) are estimated to contribute as much as 7.4 ppb to design values out over the Gulf of Mexico. Within the states out to the State Seaward Boundary (SSB), the contributions range from near zero to approximately 3 ppb, with the maximum contributions occurring along the coast of Cameron Parish, Louisiana. Contributions increase by about 10 ppb when contributions from support vessels and helicopters associated with the 2017-2022 GOM Multisale EIS scenario are added in (Source Group B). Also, adding in all existing platforms and support vessels and helicopters (Source Group C) raises the maximum contribution out over the Gulf of Mexico to nearly 38 ppb. Contributions landward of the SSB are generally below 15 ppb but with some areas along the Louisiana coast reaching maximum contributions up to 35 ppb. Adding in all other marine vessel activity in the Gulf of Mexico (Source Group D) only increases the contributions by a few ppb. The addition of land-based and Mexican and Canadian anthropogenic sources (Source Group E) results in source contributions that are typically about 30 ppb higher than the contributions from Gulf of Mexico sources alone (Source Group D). Contributions over the land areas are higher than for Source Group D although the highest contributions remain out over the Gulf of Mexico where biogenic emissions have minimal influence. In other words, to the extent that elevated ozone levels are predicted over the Gulf of Mexico, they are nearly entirely attributable to anthropogenic sources.

Contributions from natural sources (including biogenics and fires) and non-U.S. emissions, including 12-km domain boundary conditions (Source Group F), are shown in the left panel of **Figure** H-44; contributions from just the boundary conditions (BCs) are shown in the right panel. These results show an area south of Galveston where ozone design values were almost entirely driven by U.S. or Mexican anthropogenic BCs; however, over the rest of the Gulf of Mexico, including the near coastal areas, contributions are generally between 20 and 30 ppb and are overwhelmingly attributable to the BCs. Higher contributions are seen inland where biogenic sources play a larger role in ozone formation.

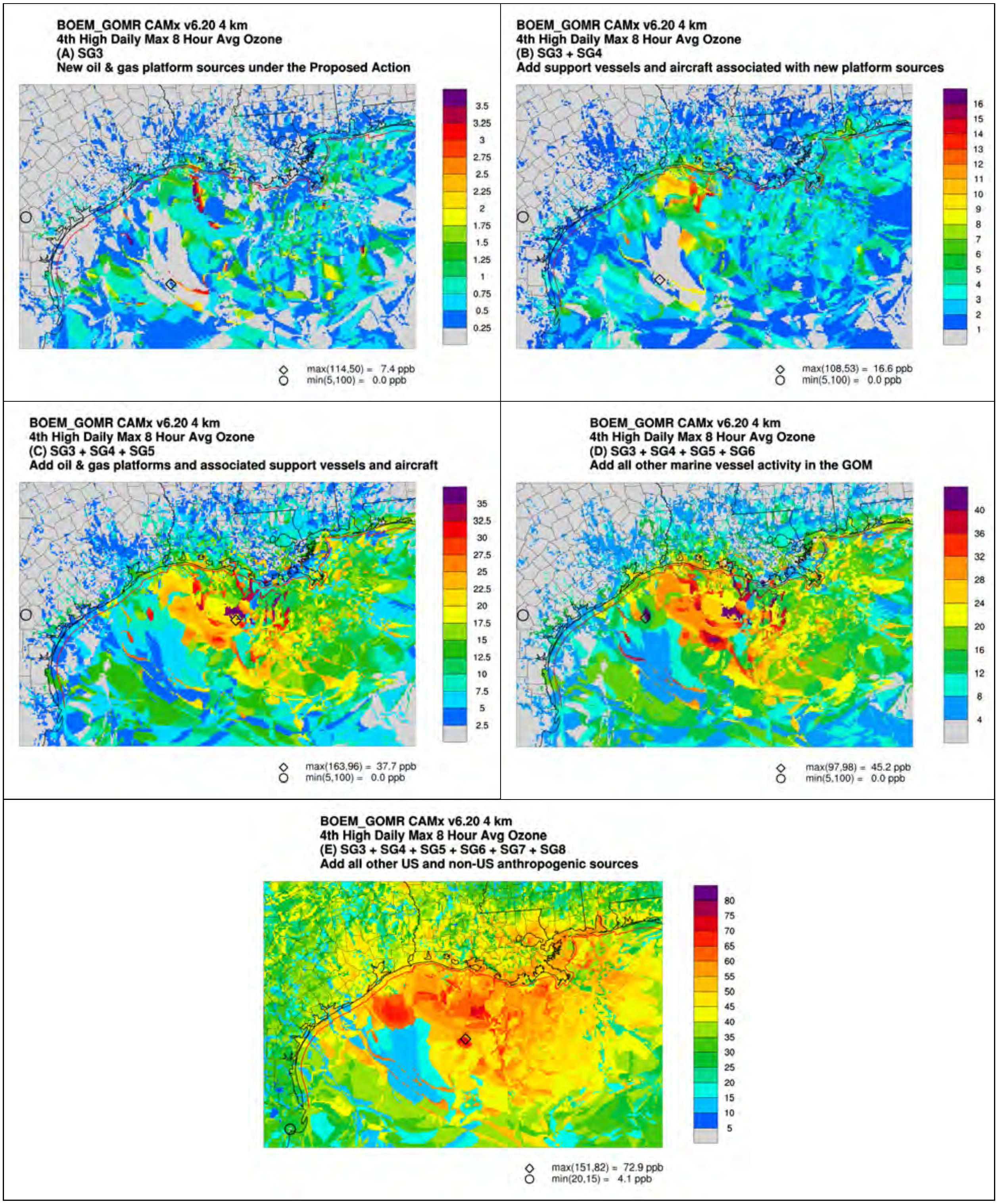


Figure H-43. Contributions of Source Groups A (top left), B (top right), C (middle left), D (middle right), and E (bottom) to Future Year All-sources 4th Highest MDA_8 (note different color scales in each panel).

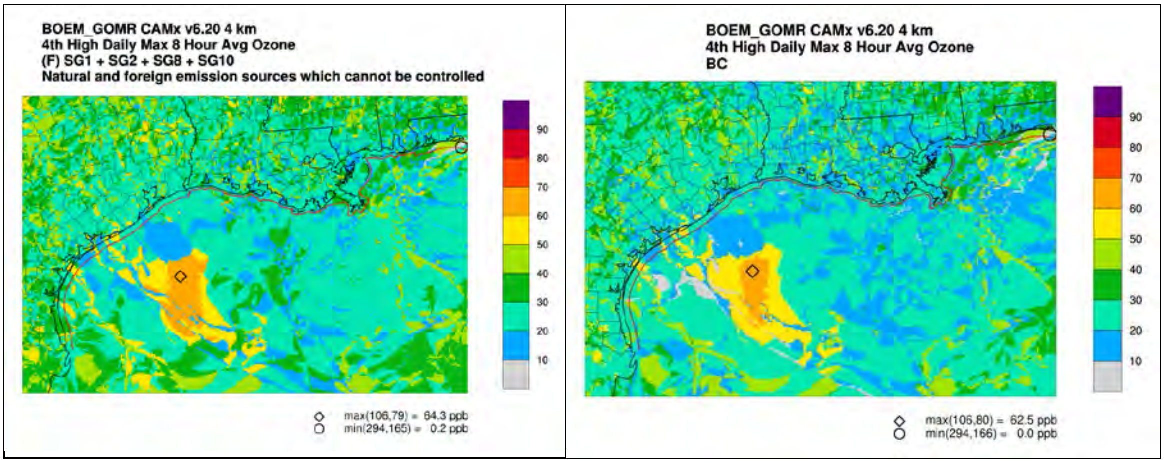


Figure H-44. Contributions from (left) Source Group F (natural and non-US emission sources including boundary conditions) and (right) Boundary Conditions Only, to Future Year All-sources 4th Highest MDA_8.

H.7.1.3 $PM_{2.5}$ NAAQS Analysis using Relative Model Results

There are two $PM_{2.5}$ NAAQS, one for 24-hour averaging time that is expressed as a 3-year average of the annual 98th percentile in a year with a threshold of 35 μg/m^3 and an annual average over 3 years with a threshold of 12 μg/m^3. With 1 year of complete everyday modeling, the annual 98th percentile will correspond to the 8th highest 24-hour $PM_{2.5}$ concentration in a year.

Predictions of future year 24-hour and annual average $PM_{2.5}$ design values were made based on the use of model results in a relative sense as was done for ozone design values in **Section H.7.1.1**. The MATS software was used to generate predicted future year design values (DVFs) from current (base year) design values (DVB or DVC). The MATS was configured to use ambient measurements of total $PM_{2.5}$ for the period 2008-2012 to generate DVCs based on an average of three overlapping 3-year average DVs as recommended in the USEPA's guidance (USEPA, 2014) and speciated $PM_{2.5}$ monitoring data for the period 2010-2012 to generate the projected DVFs based on model predicted species RRFs.

H.7.1.3.1 24-Hour $PM_{2.5}$

As described for the ozone NAAQS analysis in **Section H.7.1.1**, the MATS was used to calculate DVFs for the 24-hour and annual $PM_{2.5}$ NAAQS. Observational data for use in the MATS were provided by the USEPA[23] for use in calculating the DVCs. For total $PM_{2.5}$, observational data covered the period 2008-2012; for the speciated $PM_{2.5}$ calculations, observational data covered the period 2010-2012.

[23] https://www3.epa.gov/scram001/modelingapps_mats.htm

Results of the MATS analysis are shown in **Table H-20**. All current and future year design values are below the 35 μg/m^3 NAAQS, and the future year design values are projected to be lower than the current year design values at all sites. The reductions in the projected DVFs calculated after removing source contributions from each Source Group A, B, C, D, and E (i.e., DVF from **Table** H-20 minus DVF calculated with hourly source group contributions removed) are listed in **Table H-21**. The largest of the Source Group A, B, C, or D contributions calculated in this manner occur at the Bay Rd. monitor in Mobile County, Alabama. New platforms and associated support vessels and helicopters (Source Group B) are calculated to contribute 1.2 μg/m^3 or 6.4% of the 18.9 μg/m^3 DVF at this location.

Table H-20. Current Year (DVC) and Future Year (DVF) 24-Hour $PM_{2.5}$ Design Values for Monitoring Sites in the 4-km Modeling Domain from MATS.

Site ID	Site Name	State	County	DVC	DVF
10030010	FAIRHOPE HIGH SCHOOL, FAIRHOPE, ALABAMA	AL	Baldwin County	19.5	17.7
10970003	CHICKASAW, MOBILE CO., ALABAMA	AL	Mobile County	19.1	17.2
10972005	BAY RD., MOBILE AL.	AL	Mobile County	20	18.9
120330004	ELLYSON INDUSTRIAL PARK-COPTER ROAD	FL	Escambia County	19.2	17.6
220190009	2284 Paul Bellow Road	LA	Calcasieu Parish	18.6	17
220190010	Common and East McNeese	LA	Calcasieu Parish	20.5	18.4
220330009	1061-A Leesville Ave	LA	East Baton Rouge Parish	21	19.2
220331001	Highway 964	LA	East Baton Rouge Parish	16.7	14.2
220470005	St Gabriel Agricultural Exp. Station	LA	Iberville Parish	21	19.9
220470009	65180 Belleview Road	LA	Iberville Parish	18.6	17.5
220511001	West Temple Pl	LA	Jefferson Parish	18.7	17.1
220512001	Patriot St. and Allo St.	LA	Jefferson Parish	18.5	16.6
220550006	121 East Point Des Mouton	LA	Lafayette Parish	18.8	17.5
220550007	646 Cajundome	LA	Lafayette Parish	20.2	18.1
220790002	8105 Tom Bowman Drive	LA	Rapides Parish	19.6	17.7
220870007	24 E. CHALMETTE CIRCLE	LA	St. Bernard Parish	20.2	17.4
221050001	21549 Old Hammond Hwy, Hammond, LA 70403	LA	Tangipahoa Parish	18.8	17.2
221090001	4047 Highway 24 North Gray	LA	Terrebonne Parish	17.6	16.2
221210001	1005 Northwest Drive, Port Allen	LA	West Baton Rouge Parish	21.7	20.2
280010004	Natchez Municipal Water Works, Brenham St.	MS	Adams County	20.3	17.7
280350004	205 Bay Street	MS	Forrest County	22.4	21
280450003	400 Baltic St.	MS	Hancock County	20	18.3
280470008	47 Maple Street	MS	Harrison County	18.3	16
280590006	Hospital Road at Co. Health Dept.	MS	Jackson County	20.8	19.6
280670002	26 Mason St.	MS	Jones County	23	21.7

Site ID	Site Name	State	County	DVC	DVF
480290059	14620 LAGUNA RD.	TX	Bexar County	21.4	20.9
480612004	LOT B 69 ½	TX	Cameron County	22.7	22.4
482010058	7210 1/2 BAYWAY DRIVE	TX	Harris County	20.8	20.2
482011035	9525 CLINTON DR	TX	Harris County	24	22.7
483550032	3810 HUISACHE STREET	TX	Nueces County	24.3	23.3
484530020	12200 LIME CREEK RD.	TX	Travis County	20.7	19.1
484530021	2600 B WEBBERVILLE RD.	TX	Travis County	21.8	20.5

Table H-21. 24-Hour $PM_{2.5}$ Current (DVC) and Future Year (DVF) Design Values and Reduction in DVF with Contributions from Individual Source Groups Removed.

Site ID	State	County	DVC	DVF	Change in DVF with Source Group Removed				
					A	B	C	D	E
10030010	AL	Baldwin County	19.5	17.7	0.0	0.2	0.3	0.4	8.8
10970003	AL	Mobile County	19.1	17.2	0.0	0.1	0.1	0.2	10.2
10972005	AL	Mobile County	20	18.9	0.0	1.2	1.2	1.3	12.0
120330004	FL	Escambia County	19.2	17.6	0.0	0.0	0.1	0.1	9.2
220190009	LA	Calcasieu Parish	18.6	17	0.0	0.1	0.2	0.5	9.9
220190010	LA	Calcasieu Parish	20.5	18.4	0.0	0.0	0.1	0.3	12.1
220330009	LA	East Baton Rouge Parish	21	19.2	0.0	0.1	0.2	0.3	12.3
220331001	LA	East Baton Rouge Parish	16.7	14.2	0.0	0.1	0.2	0.4	9.1
220470005	LA	Iberville Parish	21	19.9	0.0	0.0	0.2	0.4	14.2
220470009	LA	Iberville Parish	18.6	17.5	0.0	0.0	0.1	0.3	10.2
220511001	LA	Jefferson Parish	18.7	17.1	0.0	0.0	0.2	0.3	12.0
220512001	LA	Jefferson Parish	18.5	16.6	0.0	0.1	0.2	0.4	13.1
220550006	LA	Lafayette Parish	18.8	17.5	0.1	0.2	0.5	1.0	12.1
220550007	LA	Lafayette Parish	20.2	18.1	0.0	0.0	0.2	0.3	12.3
220790002	LA	Rapides Parish	19.6	17.7	0.0	0.0	0.2	0.4	8.1
220870007	LA	St. Bernard Parish	20.2	17.4	0.0	0.0	0.2	0.4	12.0
221050001	LA	Tangipahoa Parish	18.8	17.2	0.1	0.1	0.3	0.5	9.1
221090001	LA	Terrebonne Parish	17.6	16.2	0.0	0.1	0.3	0.4	10.8
221210001	LA	West Baton Rouge Parish	21.7	20.2	0.0	0.0	0.2	0.3	13.8
280010004	MS	Adams County	20.3	17.7	0.0	0.1	0.1	0.2	7.8
280350004	MS	Forrest County	22.4	21	0.0	0.1	0.1	0.2	11.4
280450003	MS	Hancock County	20	18.3	0.0	0.1	0.6	1.1	11.4
280470008	MS	Harrison County	18.3	16	0.0	0.0	0.3	0.4	8.8
280590006	MS	Jackson County	20.8	19.6	0.1	0.1	0.4	1.1	14.3
280670002	MS	Jones County	23	21.7	0.0	0.1	0.1	0.1	11.0
480290059	TX	Bexar County	21.4	20.9	0.0	0.0	0.0	0.0	11.8
480612004	TX	Cameron County	22.7	22.4	0.0	0.7	0.7	0.8	5.4
482010058	TX	Harris County	20.8	20.2	0.0	0.0	0.2	0.5	13.1

Site ID	State	County	DVC	DVF	Change in DVF with Source Group Removed				
					A	B	C	D	E
482011035	TX	Harris County	24	22.7	0.0	0.0	0.1	0.2	14.9
483550032	TX	Nueces County	24.3	23.3	0.0	0.1	0.1	0.2	12.3
484530020	TX	Travis County	20.7	19.1	0.0	0.0	0.0	0.1	9.4
484530021	TX	Travis County	21.8	20.5	0.0	0.0	0.0	0.1	12.1

H.7.1.3.2 Annual Average $PM_{2.5}$

The MATS projections of DVF for the annual average $PM_{2.5}$ design values are shown in **Table H-22**. The only design value exceeding the 12 µg/m^3 annual average NAAQS is the current year design value at the Clinton Dr. monitor in Houston, Texas. The projected future year design value at this location is below the NAAQS. Future year design values are projected to be less than the current year design values at all monitoring sites except for a 0.3 µg/m^3 increase at the Hidalgo County monitoring site just west of Brownsville, Texas.

Reductions in the projected annual average DVFs calculated after removing source contributions from each Source Group A, B, C, D, and E (i.e., DVF from **Table H-22** minus DVF calculated with hourly source group contributions removed) are shown in **Table H-23**. The largest of the Source Group A, B, C, or D contributions calculated in this manner occur at the Bay Rd. monitor in Mobile County, Alabama. New platforms and associated support vessels and helicopters (Source Group B) are calculated to contribute 0.7 µg/m^3 or 7.7% of the 9.1 µg/m^3 DVF at this location. Source Group B contributions at the Clinton Dr. monitor are calculated to be less than 0.05 µg/m^3. Source Group B contributions at the Hidalgo County monitoring site are calculated to be 0.1 µg/m^3.

Table H-22. Current (DVC) and Projected Future (DVF) Annual Average $PM_{2.5}$ Design Values for Monitoring Sites in the 4-km Modeling Domain (highlighted values exceed the 12 µg/m^3 NAAQS).

Site ID	Site Name	State	DVC	DVF
10030010	FAIRHOPE HIGH SCHOOL, FAIRHOPE, ALABAMA	AL	9.8	9.1
10970003	CHICKASAW, MOBILE CO., ALABAMA	AL	9.7	8.9
10972005	BAY RD., MOBILE AL.	AL	9.2	9.1
120330004	ELLYSON INDUSTRIAL PARK-COPTER ROAD	FL	8.9	8.3
220190009	2284 Paul Bellow Road	LA	8.6	7.9
220190010	Common and East McNeese	LA	9.1	8.5
220330009	1061-A Leesville Ave	LA	10.3	9.6
220331001	Highway 964	LA	9.3	8.3
220470005	St Gabriel Agricultural Exp. Station	LA	10.2	9.5
220470009	65180 Belleview Road	LA	8.9	8.1
220511001	West Temple Pl	LA	9	8.2
220512001	Patriot St. and Allo St.	LA	9.2	8.3
220550006	121 East Point Des Mouton	LA	8.9	8.2
220550007	646 Cajundome	LA	9.1	8.4
220790002	8105 Tom Bowman Drive	LA	8.8	8

Site ID	Site Name	State	DVC	DVF
220870007	24 E. CHALMETTE CIRCLE	LA	10.5	9.7
221050001	21549 Old Hammond Hwy, Hammond, LA 70403	LA	9	8.1
221090001	4047 Highway 24 North Gray	LA	8.5	7.8
221210001	1005 Northwest Drive, Port Allen	LA	10.8	10.1
280010004	Natchez Municipal Water Works Brenham St	MS	10.2	9.3
280350004	205 Bay Street	MS	11.7	10.9
280450003	400 Baltic St	MS	9.9	9.1
280470008	47 Maple Street	MS	9.6	8.7
280590006	Hospital Road at Co. Health Dept.	MS	9.5	9
280670002	26 Mason St.	MS	11.8	11.3
480290059	14620 LAGUNA RD.	TX	9	8.8
480612004	LOT B 69 ½	TX	11	10.9
482010058	7210 1/2 BAYWAY DRIVE	TX	11.1	10.9
482011035	9525 CLINTON DR	TX	12.4	11.6
482150043	2300 NORTH GLASSCOCK	TX	10.4	10.7
483550032	3810 HUISACHE STREET	TX	10.3	10
484530020	12200 LIME CREEK RD.	TX	8.4	7.9
484530021	2600 B WEBBERVILLE RD.	TX	10.2	9.8

Table H-23. Annual Average $PM_{2.5}$ Future Year Design Values (DVF) and Change in DVF with Contributions from Individual Source Groups Removed (highlighted values exceed the 12 μg/m^3 NAAQS).

Site ID	State	County	DVC	DVF	Change in DVF with Source Group Removed				
					A	B	C	D	E
10030010	AL	Baldwin County	9.8	9.1	0.0	0.1	0.2	0.3	5.5
10970003	AL	Mobile County	9.7	8.9	0.0	0.1	0.1	0.2	6.2
10972005	AL	Mobile County	9.2	9.1	0.0	0.7	0.8	0.9	6.1
120330004	FL	Escambia County	8.9	8.3	0.0	0.1	0.1	0.2	5.2
220190009	LA	Calcasieu Parish	8.6	7.9	0.0	0.1	0.2	0.4	5.0
220190010	LA	Calcasieu Parish	9.1	8.5	0.0	0.0	0.2	0.4	6.3
220330009	LA	East Baton Rouge Parish	10.3	9.6	0.0	0.1	0.2	0.3	7.2
220331001	LA	East Baton Rouge Parish	9.3	8.3	0.0	0.0	0.1	0.2	6.0
220470005	LA	Iberville Parish	10.2	9.5	0.0	0.0	0.1	0.2	7.4
220470009	LA	Iberville Parish	8.9	8.1	0.0	0.0	0.1	0.3	5.5
220511001	LA	Jefferson Parish	9	8.2	0.0	0.1	0.2	0.3	6.0
220512001	LA	Jefferson Parish	9.2	8.3	0.0	0.0	0.1	0.2	6.6
220550006	LA	Lafayette Parish	8.9	8.2	0.0	0.0	0.2	0.4	5.9
220550007	LA	Lafayette Parish	9.1	8.4	0.0	0.1	0.2	0.4	6.1
220790002	LA	Rapides Parish	8.8	8	0.0	0.0	0.1	0.2	4.7
220870007	LA	St. Bernard Parish	10.5	9.7	0.0	0.1	0.2	0.3	7.3
221050001	LA	Tangipahoa Parish	9	8.1	0.0	0.1	0.2	0.3	5.0
221090001	LA	Terrebonne Parish	8.5	7.8	0.0	0.0	0.2	0.4	5.5

Site ID	State	County	DVC	DVF	Change in DVF with Source Group Removed				
					A	B	C	D	E
221210001	LA	West Baton Rouge Parish	10.8	10.1	0.0	0.0	0.1	0.2	7.9
280010004	MS	Adams County	10.2	9.3	0.0	0.0	0.1	0.2	5.4
280350004	MS	Forrest County	11.7	10.9	0.0	0.0	0.1	0.2	7.2
280450003	MS	Hancock County	9.9	9.1	0.0	0.0	0.2	0.4	6.1
280470008	MS	Harrison County	9.6	8.7	0.0	0.0	0.2	0.3	5.6
280590006	MS	Jackson County	9.5	9	0.0	0.1	0.2	0.3	6.9
280670002	MS	Jones County	11.8	11.3	0.0	0.0	0.1	0.1	7.4
480290059	TX	Bexar County	9	8.8	0.0	0.0	0.1	0.1	5.0
480612004	TX	Cameron County	11	10.9	0.0	0.3	0.4	0.5	4.9
482010058	TX	Harris County	11.1	10.9	0.0	0.0	0.1	0.3	8.0
482011035	TX	Harris County	12.4	11.6	0.0	0.0	0.0	0.2	8.8
482150043	TX	Hidalgo County	10.4	10.7	0.0	0.1	0.1	0.1	6.4
483550032	TX	Nueces County	10.3	10	0.0	0.0	0.1	0.1	6.0
484530020	TX	Travis County	8.4	7.9	0.0	0.0	0.0	0.1	4.4
484530021	TX	Travis County	10.2	9.8	0.0	0.0	0.0	0.1	6.1

Figure H-43 displays the MATS UAA results for the annual average $PM_{2.5}$ DVC, DVF, and the difference, DVF - DVC.[24] Reductions in annual average $PM_{2.5}$ design values associated with emission reductions from all sources combined are projected throughout nearly the entire domain, with the exception of increases near the Freshwater Bayou Canal in Vermilion Parish, Louisiana, and Brownsville, Texas, in addition to a few additional areas in Texas and southern Louisiana. Some of the isolated areas of increases may represent artifacts of the MATS UAA spatial interpolation procedure and are not necessarily physically meaningful. Increases in the coastal ports are associated with new platforms and support vessel and helicopter traffic (Source Group B), as shown by the unmonitored area source group contributions in **Figure H-46**. Source Group B contributes as much as 1.8 μg/m^3 in these areas.

[24] The UAA analysis could only be performed for the annual average $PM_{2.5}$ NAAQS as the MATS software cannot calculate UAA results for the 24-hour average $PM_{2.5}$ NAAQS.

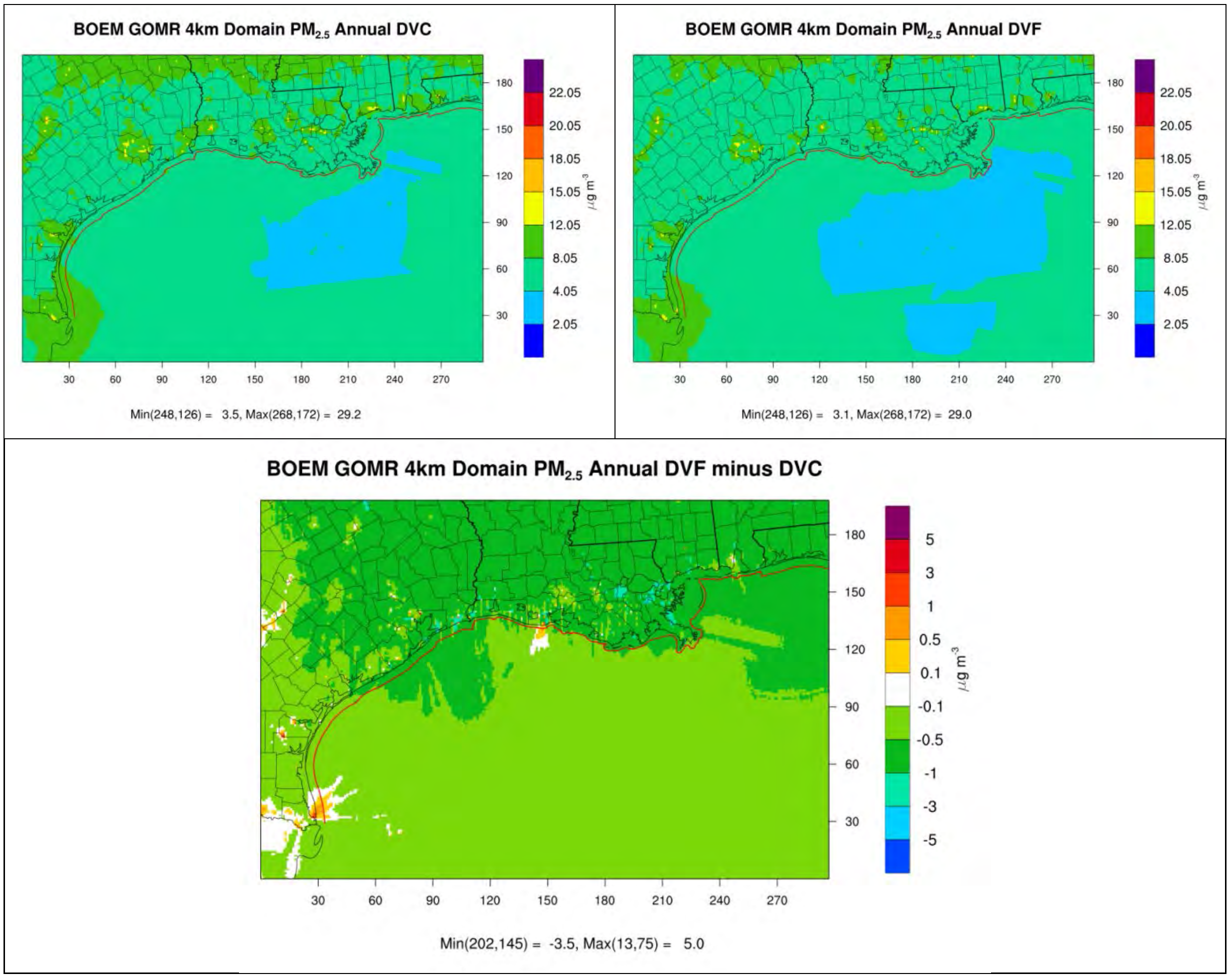


Figure H-45. Current Year (DVC) and Future Year (DVF) Annual Average $PM_{2.5}$ Design Values from the MATS Unmonitored Area Analysis (top left and top right, respectively) and the Difference, DVF – DVC (bottom).

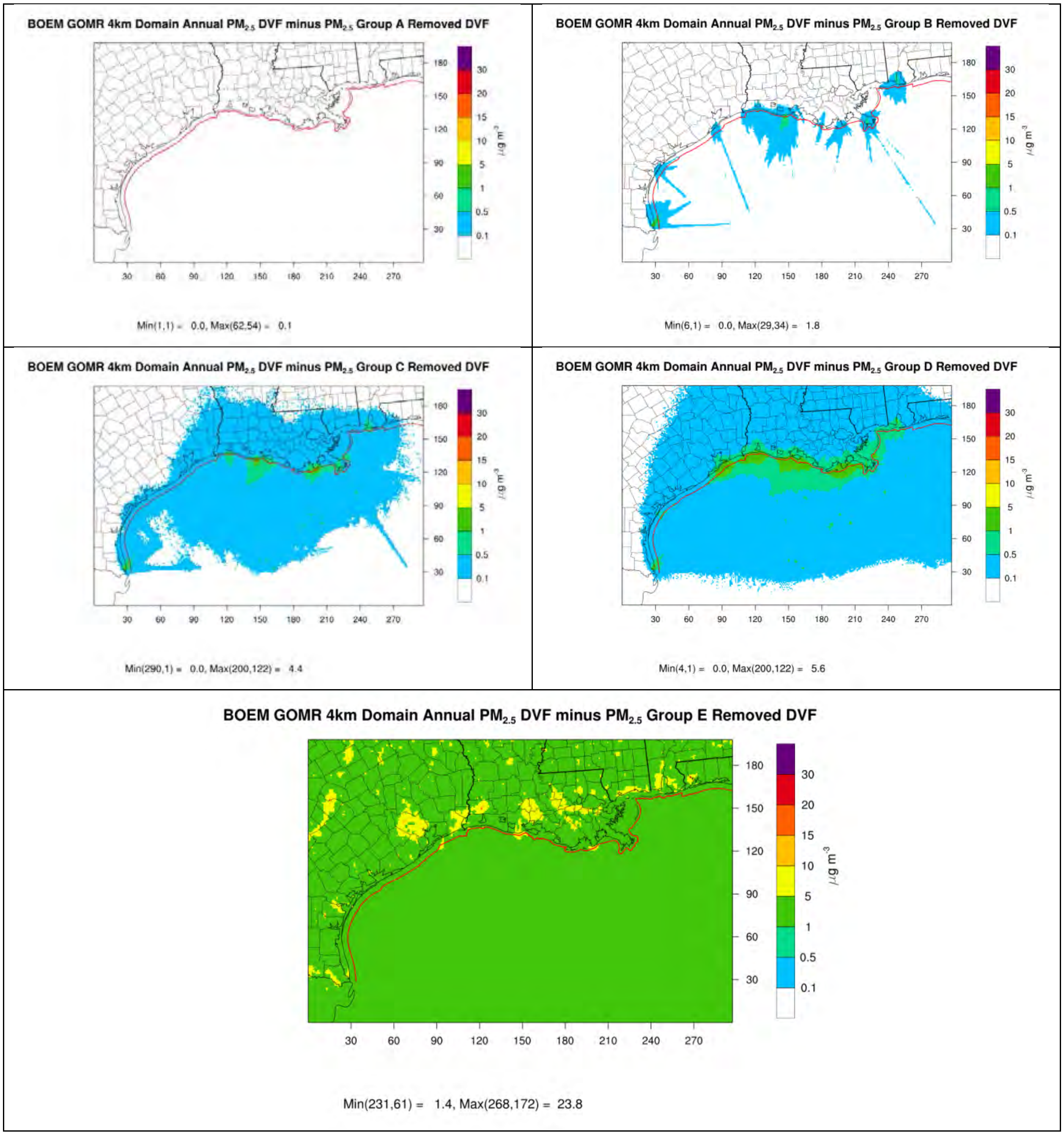


Figure H-46. Contributions of Source Groups A (top left), B (top right), C (middle left), D (middle right), and E (bottom) to the Future Year All-sources Annual Average $PM_{2.5}$ Concentration Based on the MATS Unmonitored Area Analysis (note different color scales used in each panel).

H.7.1.4 $PM_{2.5}$ NAAQS Analysis using Absolute Model Predictions

The CAMx source apportionment absolute modeling results from the future year scenario are analyzed and compared with the $PM_{2.5}$ 24-hour and annual NAAQS in this section.

H.7.1.4.1 24-Hour $PM_{2.5}$

The 24-hour $PM_{2.5}$ NAAQS is defined as the three-year average of the annual 98th percentile daily average which corresponds to the 8th highest daily average in each year assuming complete data. Since only one calendar year of modeling results are available for the base year and future year scenarios, the future year 8th highest daily average $PM_{2.5}$ concentration is selected for comparison with the NAAQS.

Modeled 8th highest daily $PM_{2.5}$ concentrations in each model grid cell for the base and future year scenarios and the corresponding differences are shown in **Figure H-47**. Areas of high predicted $PM_{2.5}$ occur along the Alabama, Louisiana and east Texas Gulf coasts in both the base and future year scenarios. Although predicted 8th highest daily $PM_{2.5}$ concentrations in these areas exceed the 35 μg/m^3 NAAQS, both base-year monitored design values (DVCs) and projected future year design values (DVFs) are below the NAAQS at monitoring sites in these areas as noted in **Section H.7.1.3.1** above. A tendency towards over prediction of daily $PM_{2.5}$ noted in the model performance evaluation results presented in **Section H.5**. The difference plot at the bottom of **Figure H-47** shows $PM_{2.5}$ reductions in the majority of the domain with some areas of increases in $PM_{2.5}$ along portions of the immediate shoreline and offshore in the western Gulf where additional activities are anticipated under the 2017-2022 GOM Multisale EIS scenario. Where $PM_{2.5}$ increases are predicted, they are limited to less than 15 μg/m^3 for nearly all grid cells.

Source group contributions to the annual 8th highest daily average $PM_{2.5}$ concentrations under the future year scenario are shown in **Figure H-48**. These contributions are matched in time to the all sources 8th highest daily average $PM_{2.5}$ concentrations; contributions may be different during other periods with elevated daily average $PM_{2.5}$ values. Impacts of the new sources associated with the 2017-2022 GOM Multisale EIS scenario (Source Groups A and B) are largely focused on the area offshore of western Louisiana. Impacts from new platforms associated with the 2017-2022 GOM Multisale EIS scenario (Source Group A) are less than 1 μg/m^3; adding in support vessels and helicopters (Source Group B) increases the near-shore impacts up to a maximum of 7 μg/m^3 as compared to a combined maximum impact of all Gulf of Mexico sources (Source Group D) of 44 μg/m^3.

Contributions from Source Group E, which includes Source Group D plus all other U.S. and non-U.S. anthropogenic sources, shows the influence of inland urban areas on $PM_{2.5}$ levels, especially in Baton Rouge and Lake Charles, Louisiana.

Contributions from Source Group F (natural and non-U.S. emission sources including boundary conditions) shown in the left panel of **Figure H-49** are dominated by fire emissions near Beaumont, Texas, and in Vermilion and Lafourche Parishes, Louisiana. Boundary condition contributions are less than 4 μg/m^3 in the coastal areas as shown in the right panel of **Figure H-49**.

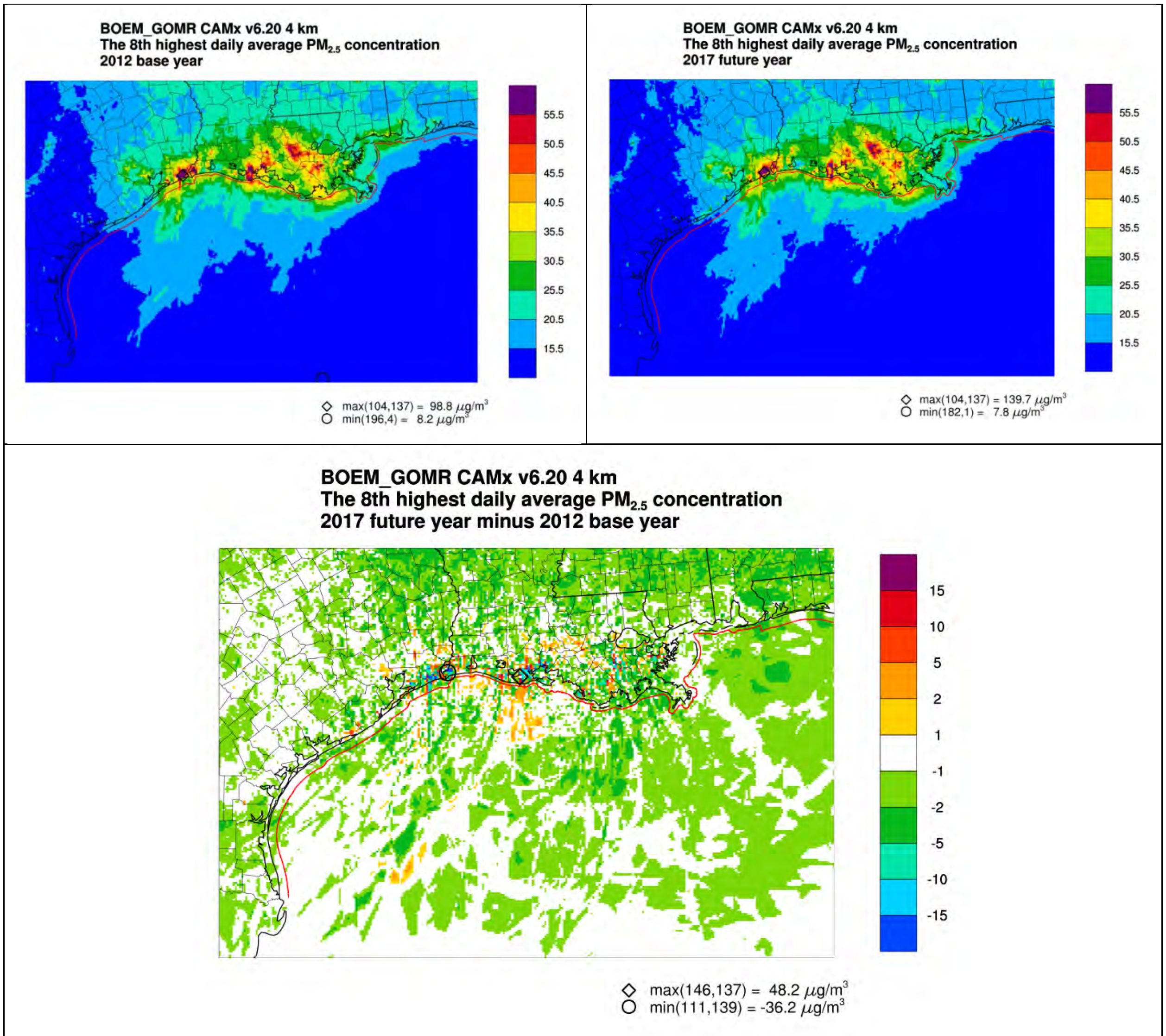


Figure H-47. Modeled 8th Highest Daily Average $PM_{2.5}$ Concentrations for the Base Year (top left), Future Year (top right), and the Future – Base Difference (bottom).

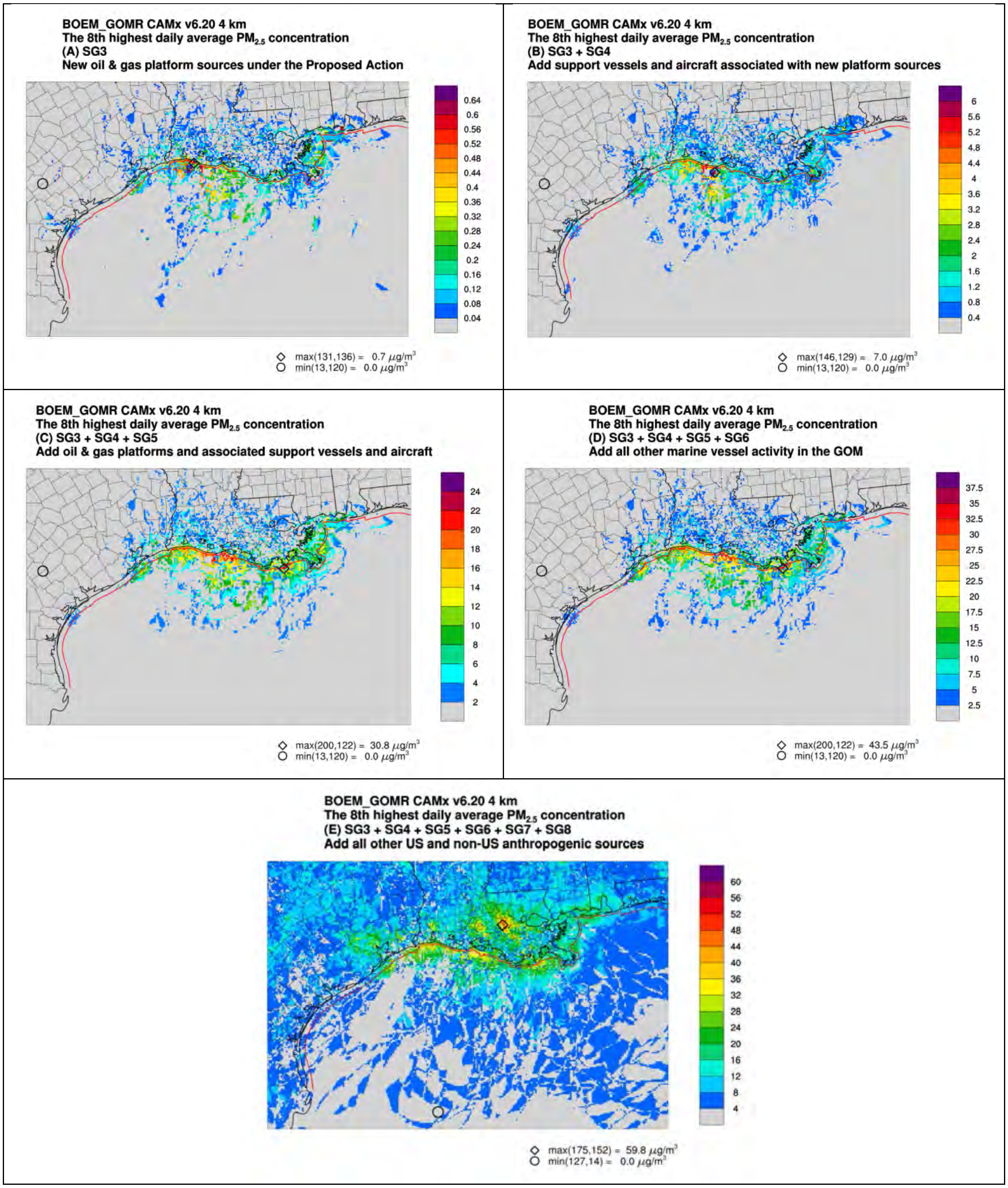


Figure H-48. Contributions of Source Groups A (top left), B (top right), C (middle left), D (middle right), and E (bottom) to the Future Year All-sources 8th Highest Daily Average $PM_{2.5}$ Concentration (note different color scales used in each panel).

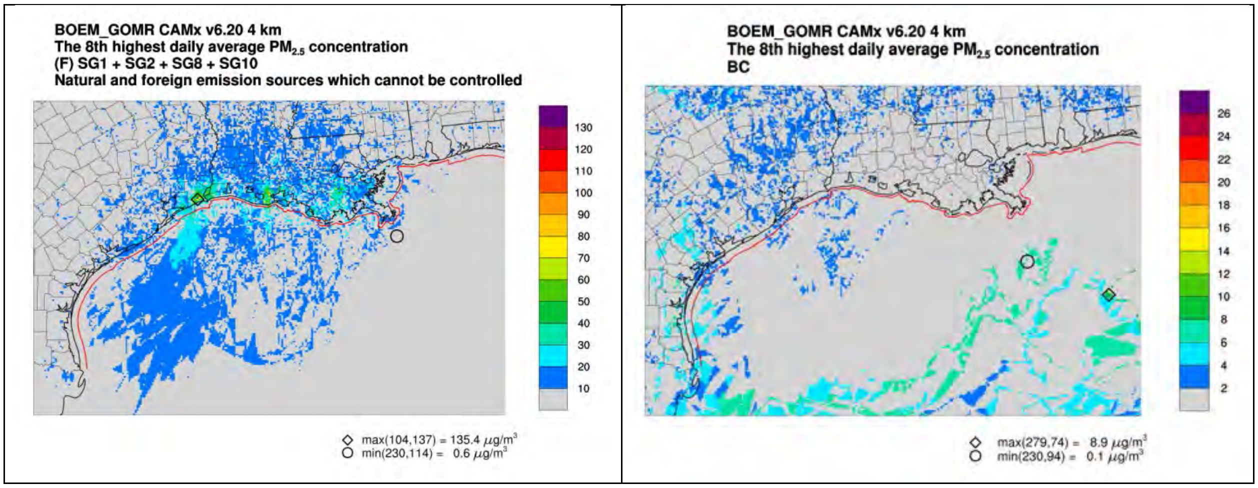


Figure H-49. Contributions from (left) Source Group F (natural and non-U.S. emission sources including boundary conditions) and (right) Boundary Conditions Only to Future Year All-sources 8^{th} Highest 24-hour $PM_{2.5}$ (note use of different color scale in each panel).

7.1.4.2 Annual Average $PM_{2.5}$

Modeled annual average $PM_{2.5}$ for the base year, future year, and the future – base differences are shown in **Figure H-50**. Average $PM_{2.5}$ concentrations decrease on most locations between the base and future year scenarios with changes over the western GOM between ± 0.5 µg/m^3. Increases of up to 2.5 µg/m^3 are calculated to occur in coastal Vermilion Parish, Louisiana.

Source group contributions to the annual average $PM_{2.5}$ concentrations under the future year scenario are shown in **Figure H-51**. Impacts of the new sources associated with the 2017-2022 GOM Multisale EIS scenario (Source Group B) are largely focused on the area offshore of western Louisiana with a maximum impact of 2.2 µg/m^3 as compared to a combined maximum impact of all GOM sources (Source Group D) of 9.3 µg/m^3. Source Group F contributions (natural and non-U.S. emission sources including boundary conditions) shown in the left panel of **Figure H-52** are dominated by fire emissions near Beaumont, Texas, and in Vermilion and Lafourche Parishes, Louisiana. Boundary condition contributions are less than 2 µg/m^3 in the coastal areas as shown in the right panel of **Figure H-52**.

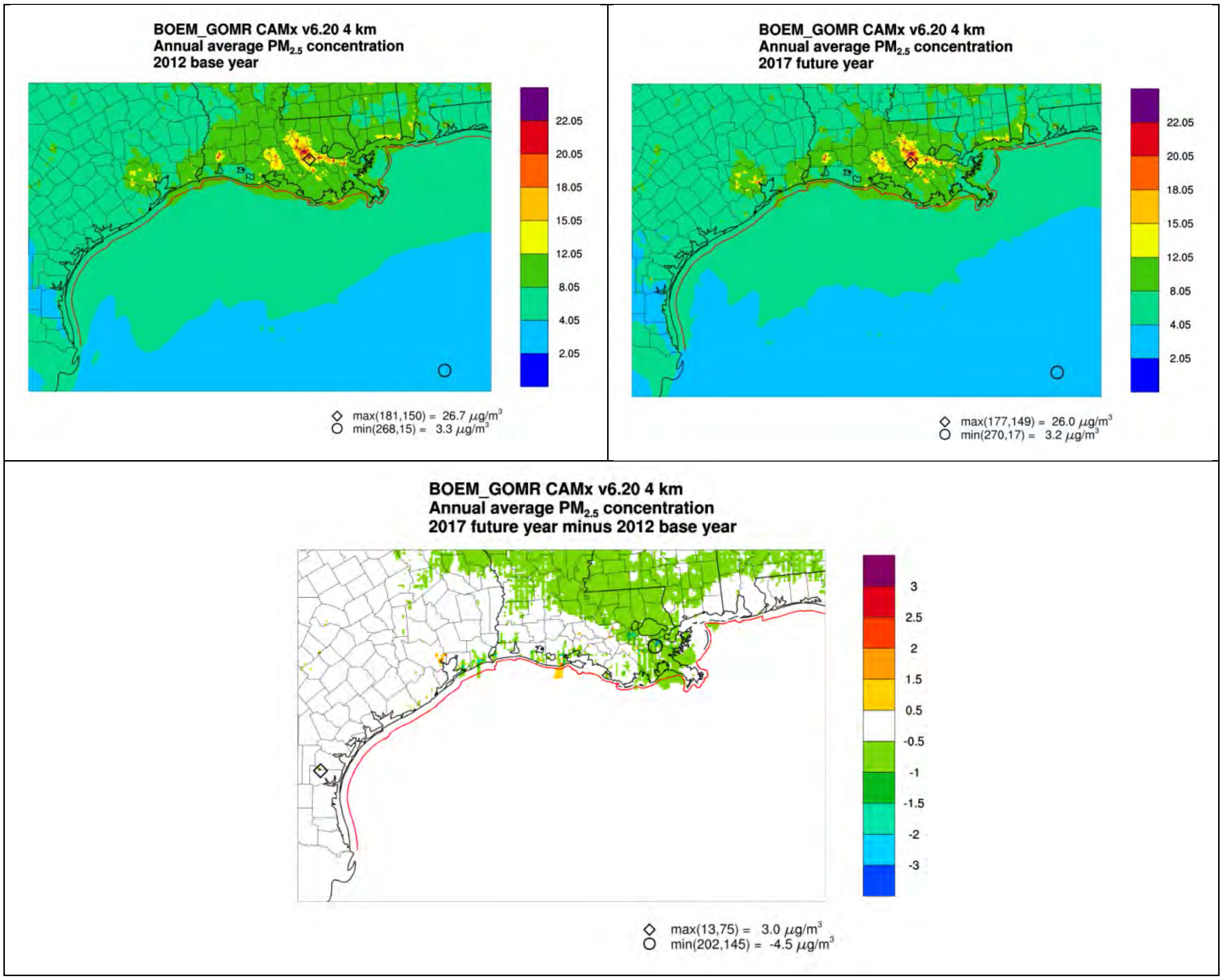


Figure H-50. Modeled Annual Average $PM_{2.5}$ Concentrations for the Base Year (top left), Future Year (top right), and the Future – Base Difference (bottom).

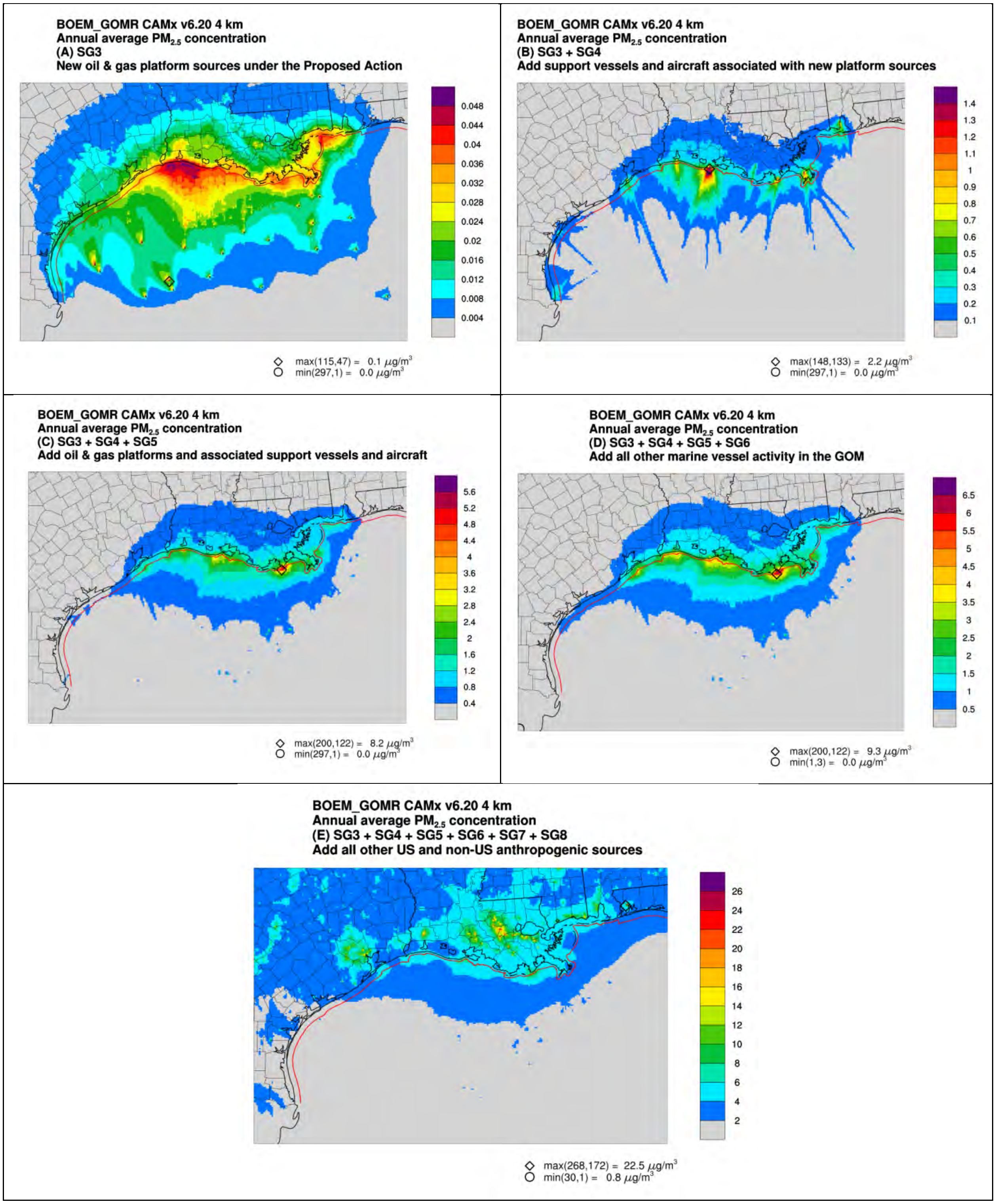


Figure H-51. Contributions of Source Group A (top left), B (top right), C (middle left), D (middle right), and E (bottom) to the Future Year All-sources Annual Average $PM_{2.5}$ Concentration (note use of different color scales in each panel).

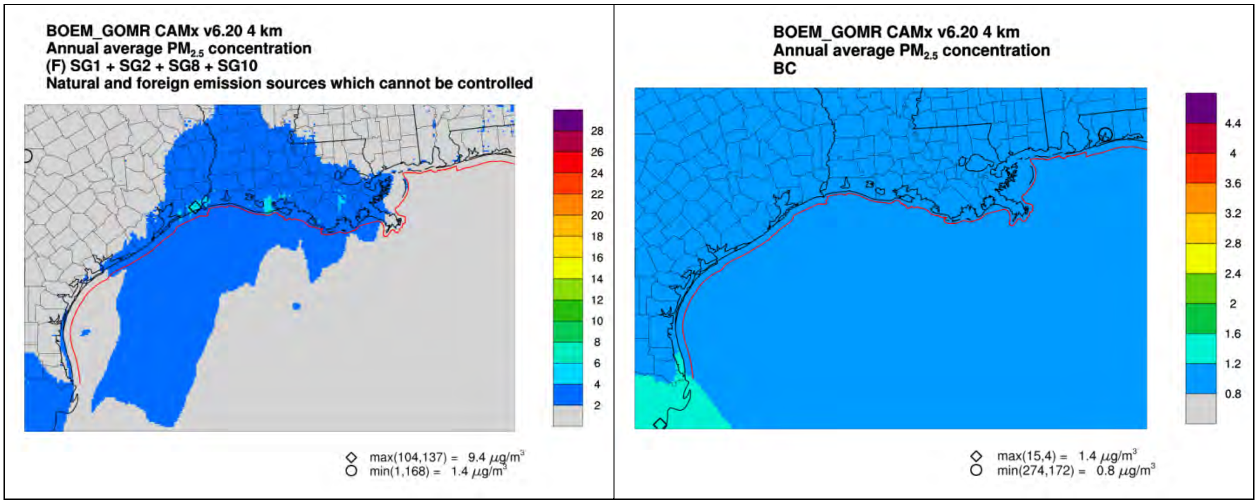


Figure H-52. Contributions from (left) Source Group F (natural and non-U.S. emission sources including boundary conditions) and (right) Boundary Conditions Only to Future Year All-sources Annual Average $PM_{2.5}$ (note use of different color scale in each panel).

H.7.1.5 NAAQS Analysis for other Criteria Air Pollutants

H.7.1.5.1 PM_{10}

Figure H-53 displays modeled 2nd highest daily average PM_{10} concentrations than can be compared with the 24-hour average PM_{10} NAAQS (150 μg/m^3) for the base and future scenarios and the base-future differences. Areas of elevated PM_{10} are evident in urban and port areas and in fire zones along the Gulf Coasts of Texas and Louisiana (impacts of fires on PM_{10} can be discerned from the left panel of **Figure H-55** described below). The PM_{10} decreases are modeled along the Louisiana coast with increases of between 2 and 5 μg/m^3 in waters farther offshore associated with new emissions from the 2017-2022 GOM Multisale EIS scenario sources.

Source group contributions to the 2nd highest daily average PM_{10} concentrations are shown in **Figure H-54**. The maximum contribution of the new platforms and associated support vessels and aircraft under the 2017-2022 GOM Multisale EIS scenario (Source Group B) is predicted to be 10.7 μg/m^3 or 7% of the NAAQS. The maximum contribution of all oil and gas platforms and support vessels and helicopters (Source Group C) is 41 μg/m^3 (28% of the NAAQS). Fires dominate contributions from natural and non-U.S. sources (**Figure H-55**).

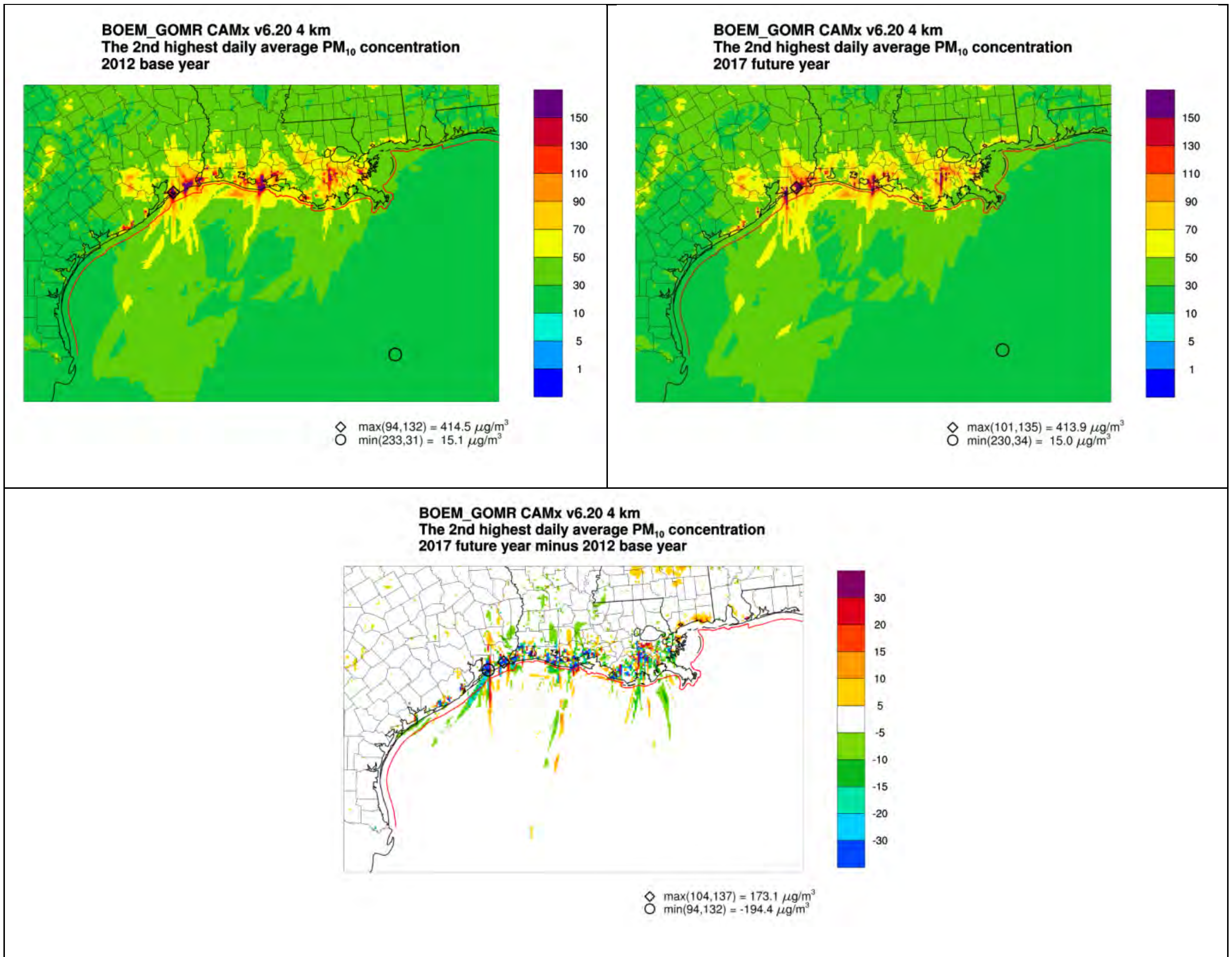


Figure H-53. Modeled 2nd Highest 24-hour Average PM_{10} Concentrations for the Base Year (top left), Future Year (top right), and the Future – Base Difference (bottom).

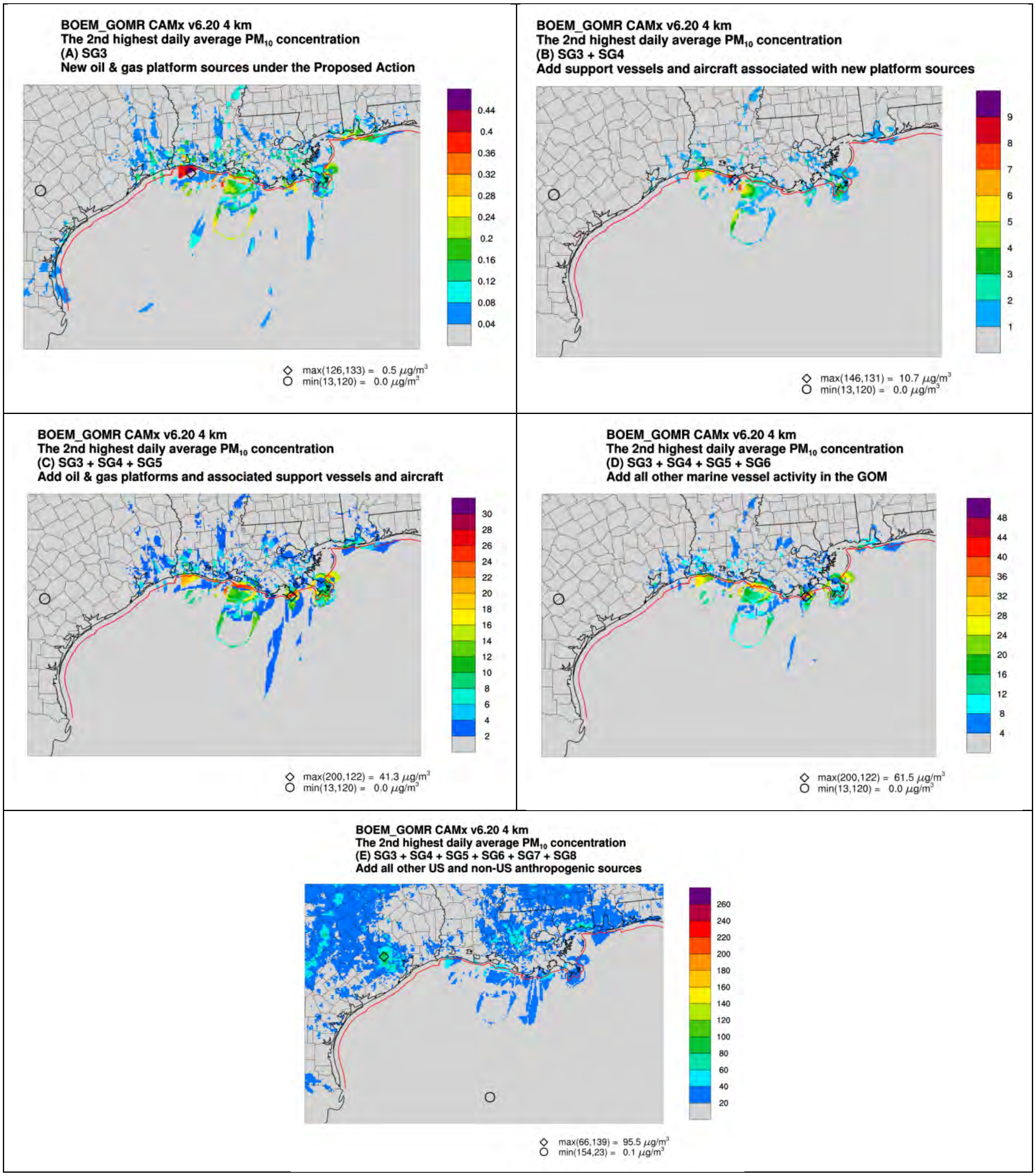


Figure H-54. Contributions of Source Groups A (top left), B (top right), C (middle left), D (middle right), and E (bottom) to the Future Year All-sources 2^{nd} Highest Daily Average PM_{10} Concentration (note use of different color scales in each panel).

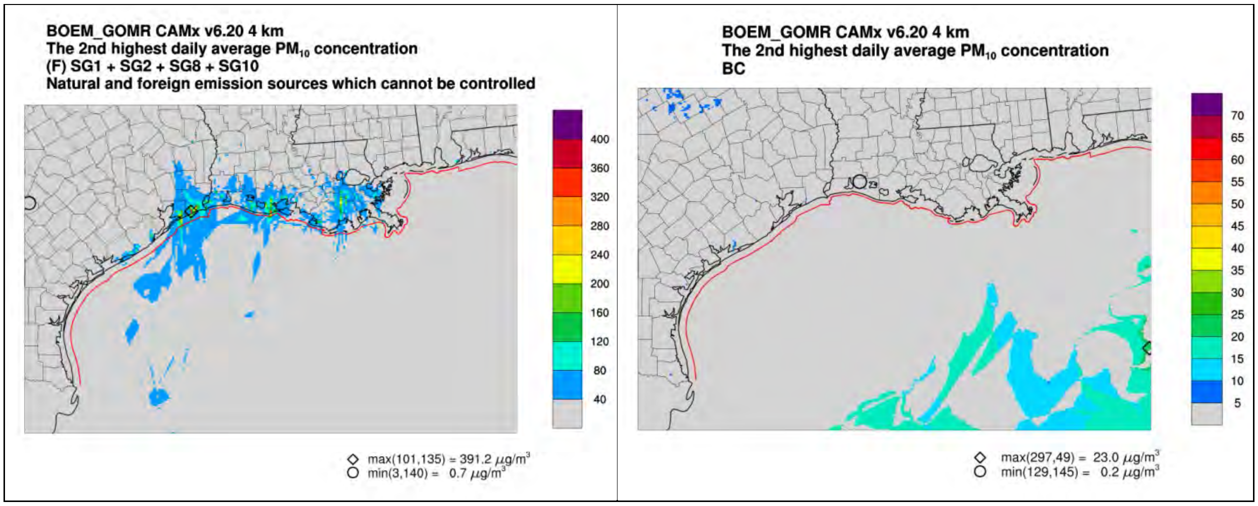


Figure H-55. Contributions from (left) Source Group F (natural and non-U.S. emission sources including boundary conditions) and (right) Boundary Conditions Only to Future Year All-sources 2nd Highest Daily Average PM_{10} Concentration (note use of different color scale in each panel).

H.7.1.5.2 NO_2

Results are presented here for both the 1-hour average NO_2 NAAQS (100 ppb) and the annual average NO_2 NAAQS (53 ppb). **Figure H-56 and Figure** H-57 display modeled 1-hour average NO_2 design values (based on the 8th highest daily average) for the base and future year scenarios along with source group contributions to the future year design values. All modeled 1-hour NO_2 concentrations are below the NAAQS (100 ppb); concentrations in the immediate vicinity of the Louisiana Offshore Oil Port (LOOP) peak at 98.5 ppb. Concentrations decrease between the base and future year scenarios at most locations except for of as much as a 32-ppb increase in coastal Vermilion Parish, Louisiana. Increases are also projected offshore of Texas and Alabama and in some interior portions of Texas.

Source Group contributions to the 8th highest daily average NO_2 concentrations are shown in **Figure H-57**. Contributions from new platforms and support vessels and helicopters associated with the 2017-2022 GOM Multisale EIS scenario (Source Group B) are dominated by vessel and possibly helicopter traffic in the port areas, most notably in Vermilion Parish, Louisiana, where the maximum contribution is 55.6 ppb. Combined contributions from new and existing platforms and support vessels and helicopters (Source Group C) are dominant in the area of the LOOP. Contributions from natural and foreign sources are less than 10 ppb (not shown).

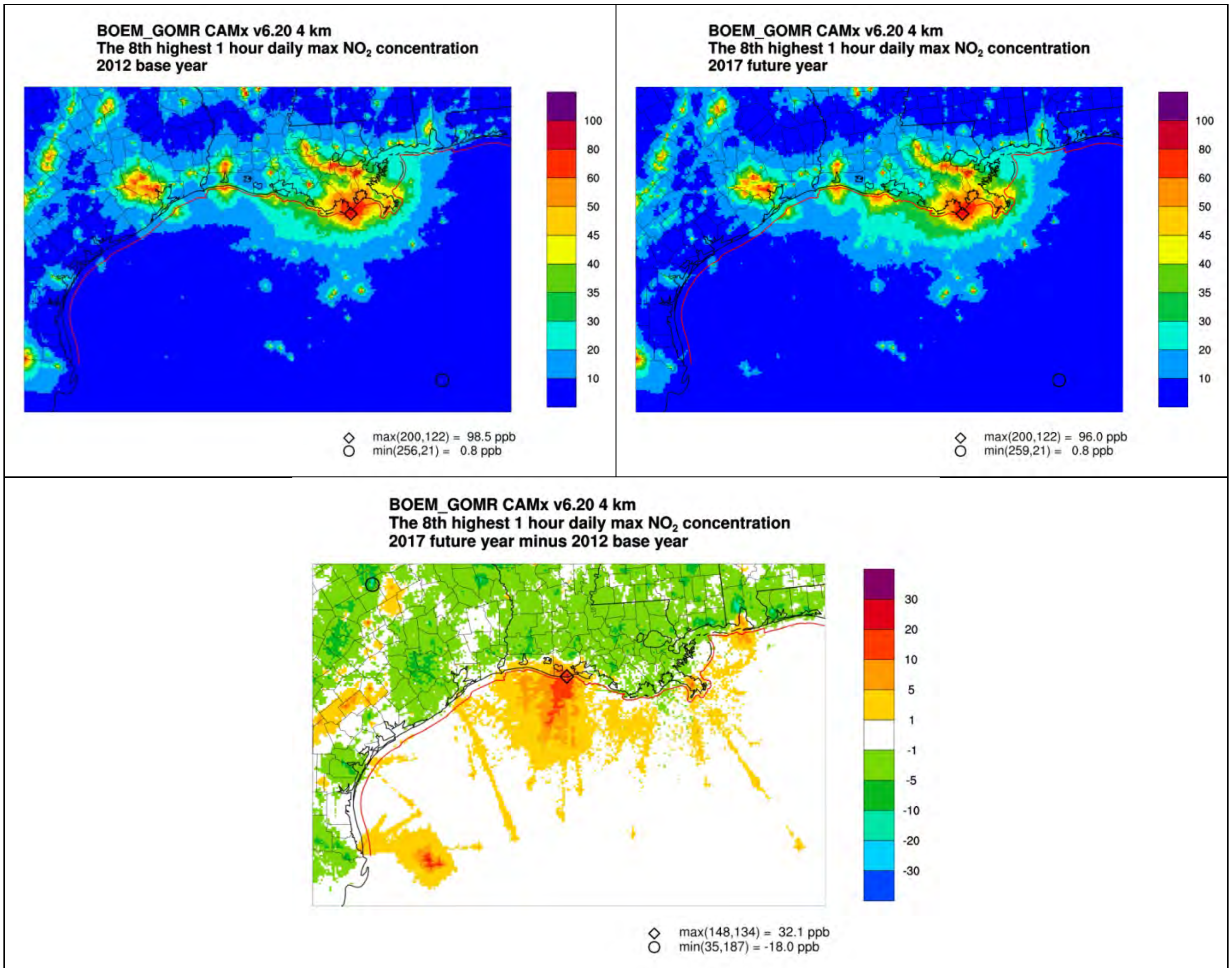


Figure H-56. Modeled 8th Highest 1-hour NO_2 Concentrations for the Base Year (top left), Future Year (top right), and the Future – Base Difference (bottom).

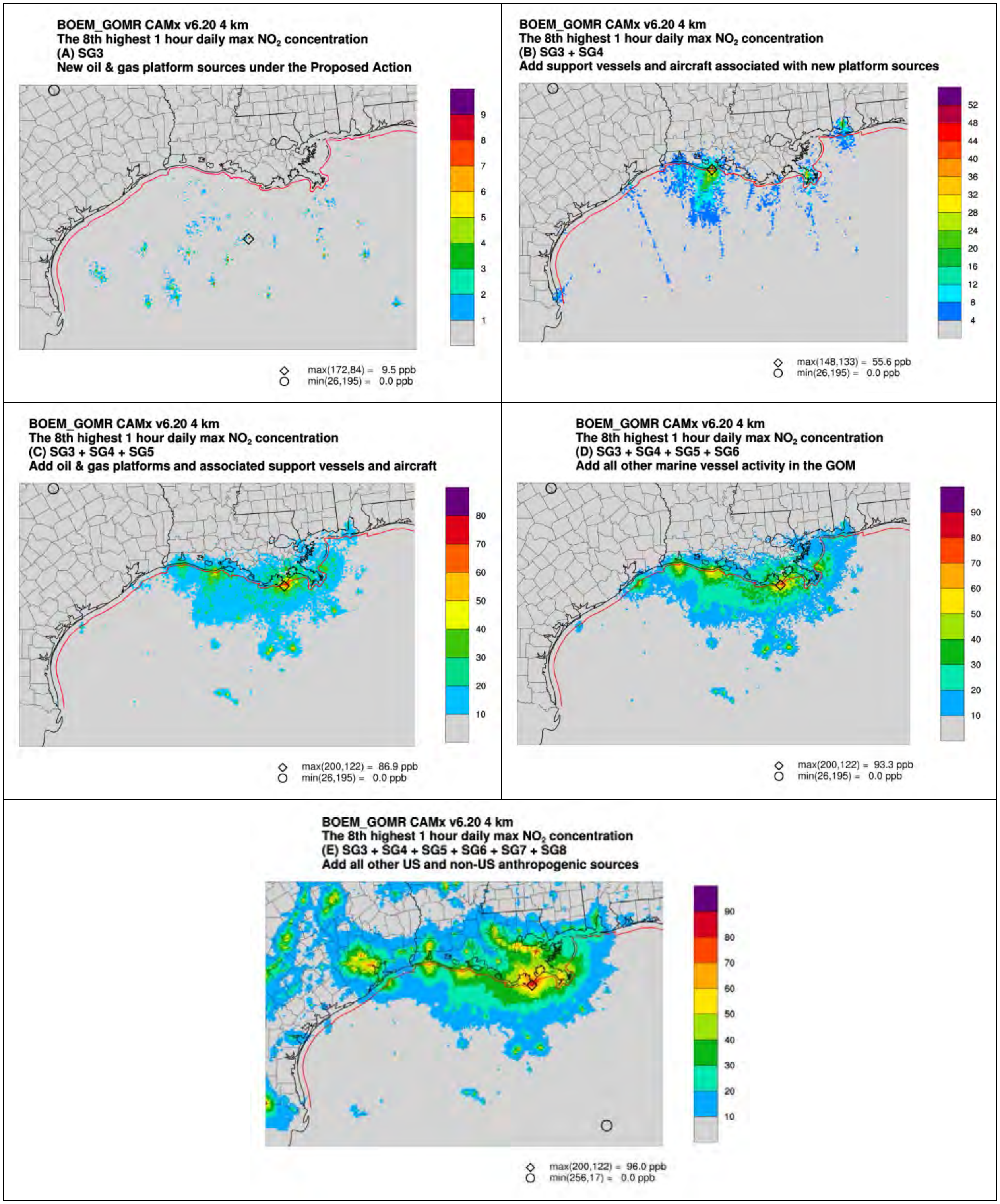


Figure H-57. Contributions of Source Group A (top left), B (top right), C (middle left), D (middle right), and E (bottom) to the Future Year All-sources 8th Highest Daily Average NO_2 Concentrations (note use of different color scales in each panel).

Figure H-58 and Figure H-59 display modeled annual average NO_2 concentrations for the base case and future year scenarios, along with source group contributions to the future year annual averages. All modeled concentrations are below the NAAQS. Increases between the base case and future year scenarios of as much as 8 ppb are modeled to occur near the entrance to the Freshwater Bayou Canal in Vermilion Parish, Louisiana. Somewhat larger increases are modeled in the Permian Basin of west Texas.

Contributions of Source Groups to the annual average NO_2 concentrations are shown in **Figure H-59**. These results are similar to those for 1-hour NO_2 shown above. Maximum impacts from new platforms and support vessels and helicopters associated with the 2017-2022 GOM Multisale EIS scenario are as much as 8.6 ppb (16% of the NAAQS).

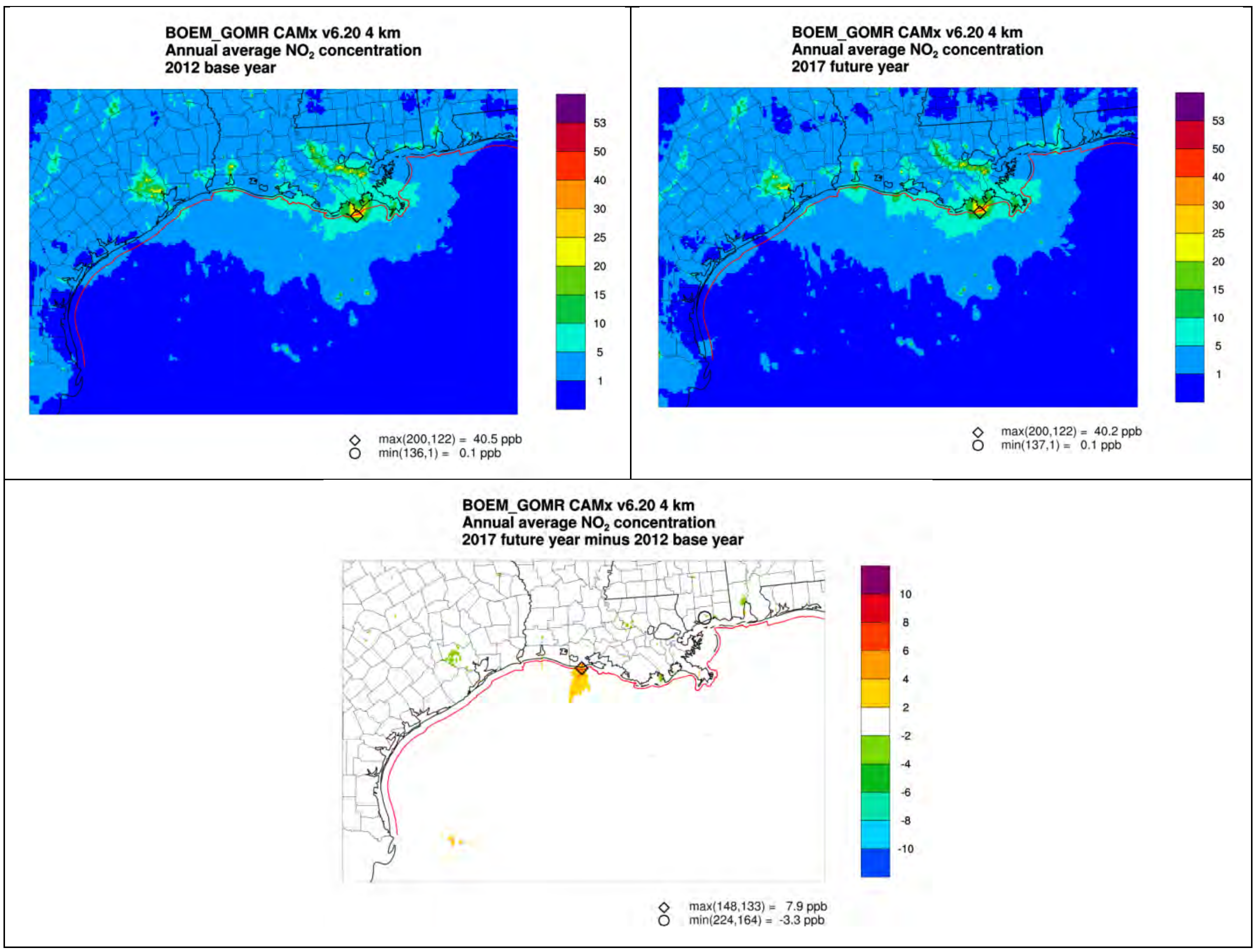


Figure H-58. Modeled Annual Average NO_2 Concentrations for the Base Year (top left), Future Year (top right), and the Future – Base Difference (bottom).

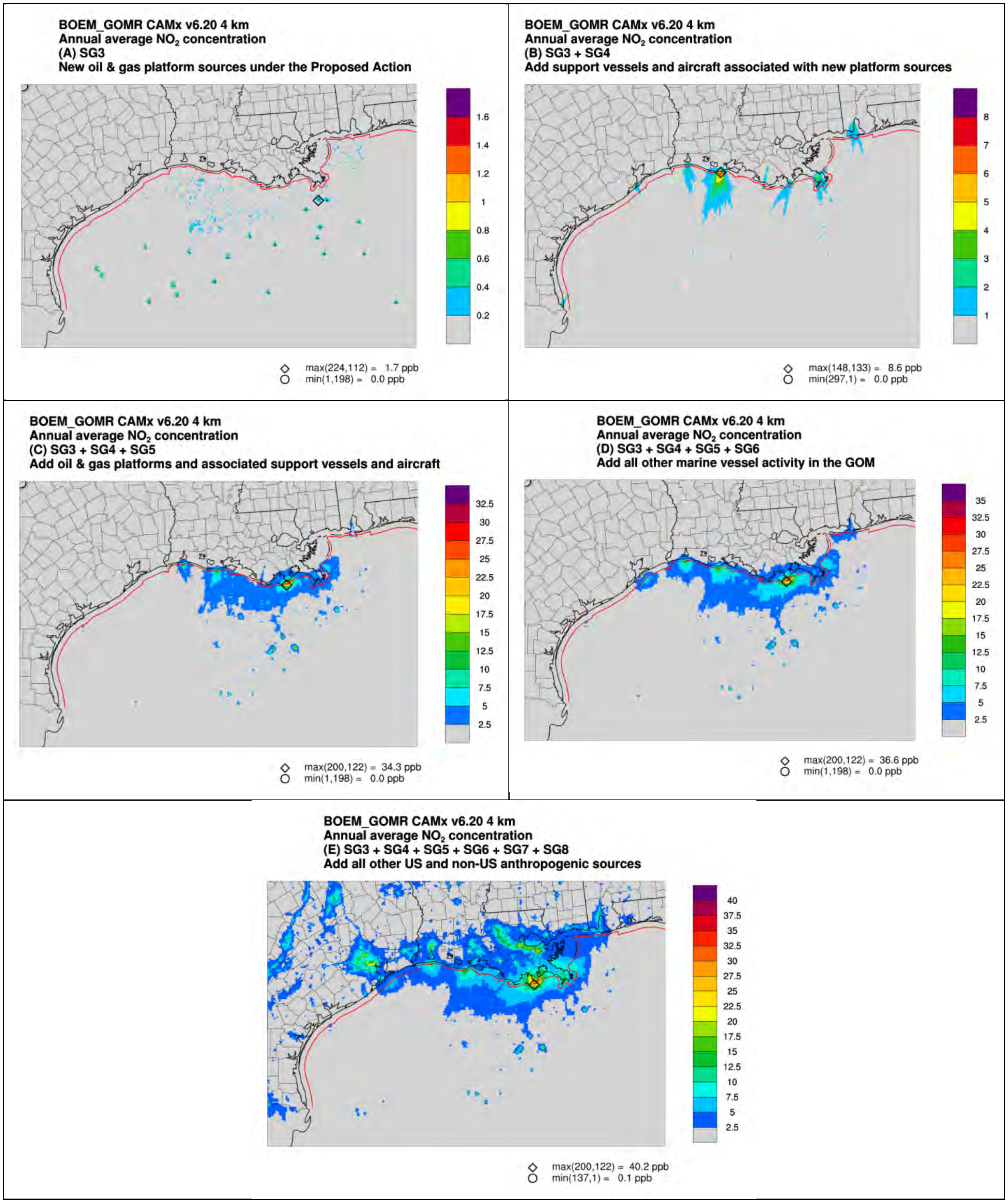


Figure H-59. Contributions of Source Groups A (top left), B (top right), C (middle left), D (middle right), and E (bottom) to the Future Year All-sources Annual Average NO_2 Concentrations.

H.7.1.5.3 SO_2

Results are presented here for both the 1-hour average primary SO_2 NAAQS (75 ppb) and the 3-hour average secondary SO_2 NAAQS (0.5 ppm).

Figure H-60 displays modeled 1-hour SO_2 design values (based on the 4th highest daily maximum 1-hour average SO_2 concentration) for the base, future, and future-base scenarios. Modeled values for the base year are generally below the NAAQS except in the immediate vicinity of some major point sources. Sources in areas with deepwater platforms are evident with maximum values up to 50 ppb. Concentrations decrease in most locations in the future year scenario as sources are retired or apply control equipment with projected maximum impacts all below the NAAQS. No increases in excess of 5 ppb are modeled along the Gulf Coast or over the open ocean.

Contributions of source groups to the modeled 1-hour SO_2 concentrations are shown in **Figure H-61**. New sources associated with the 2017-2022 GOM Multisale EIS scenario (Source Group B) are modeled to contribute less than 1 ppb.

Figure H-62 displays modeled 3-hour SO_2 design values (based on the annual 2nd highest block, 3-hour average SO_2 concentration) for the base, future, and future-base scenarios. All modeled values are below the NAAQS (500 ppb). These results are similar to those for the 1-hour SO_2 described above.

Contributions of source groups to the modeled 3-hour SO_2 concentrations are shown in **Figure H-63**. Results are similar to those for the 1-hour SO_2 concentrations described above.

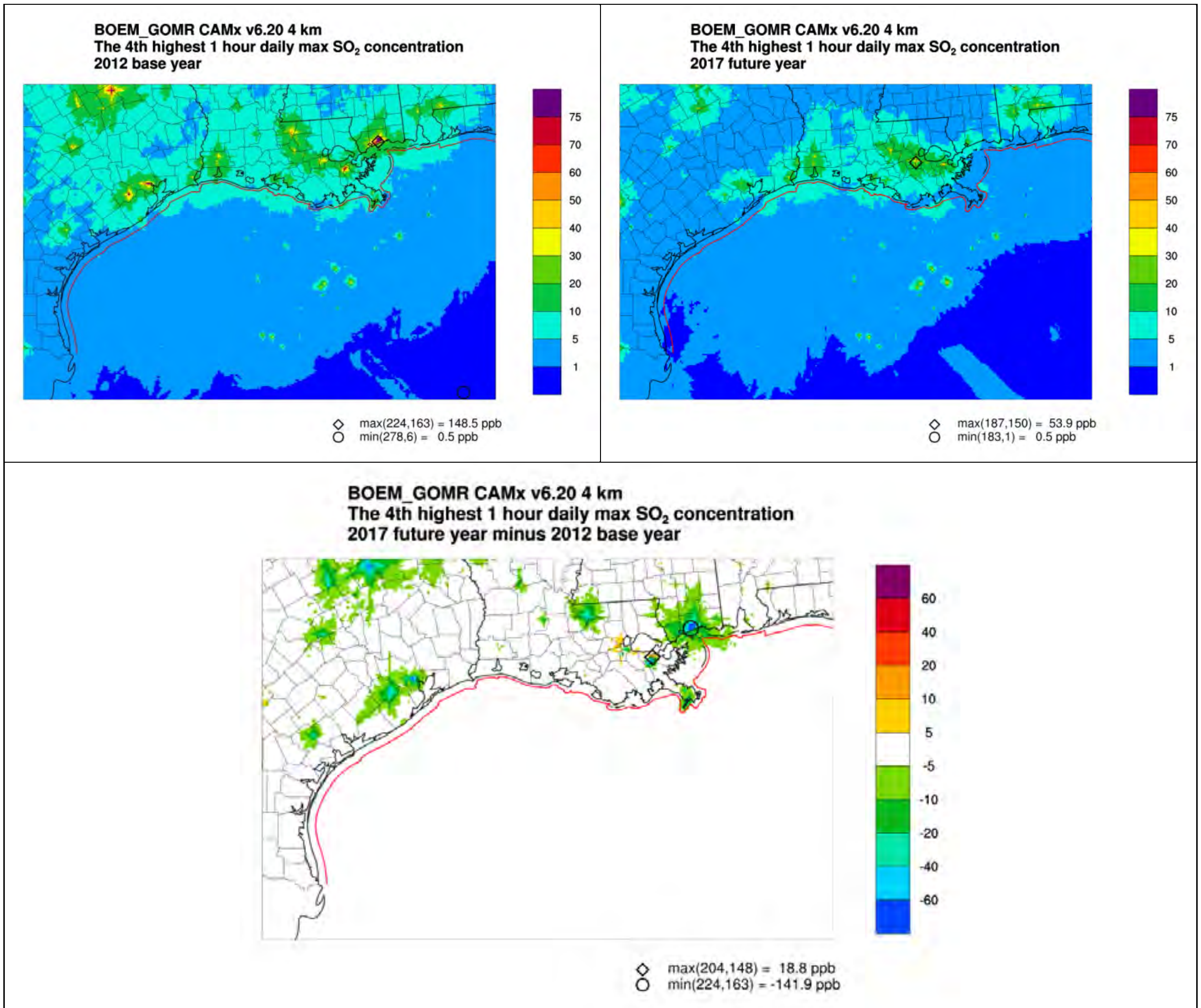


Figure H-60. Modeled 4th Highest Daily Maximum 1-hour SO_2 Concentrations for the Base Year (top left), Future Year (top right), and the Future – Base Difference (bottom).

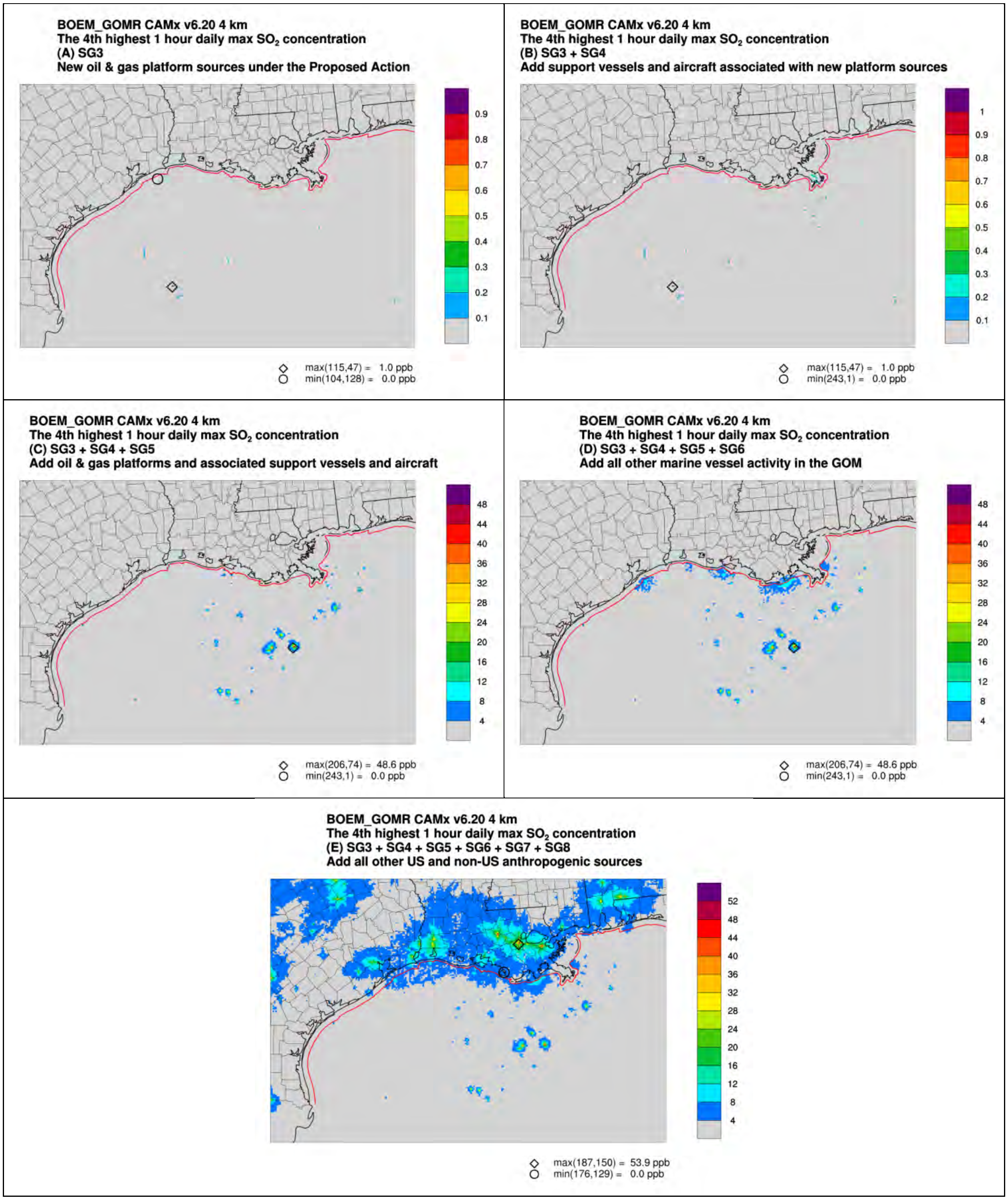


Figure H-61. Contributions of Source Group A (top left), B (top right), C (middle left), D (middle right), and E (bottom) to the Future Year All-sources 4^{th} Highest Daily Maximum 1-hour SO_2 Concentration (note different color scales used in each panel).

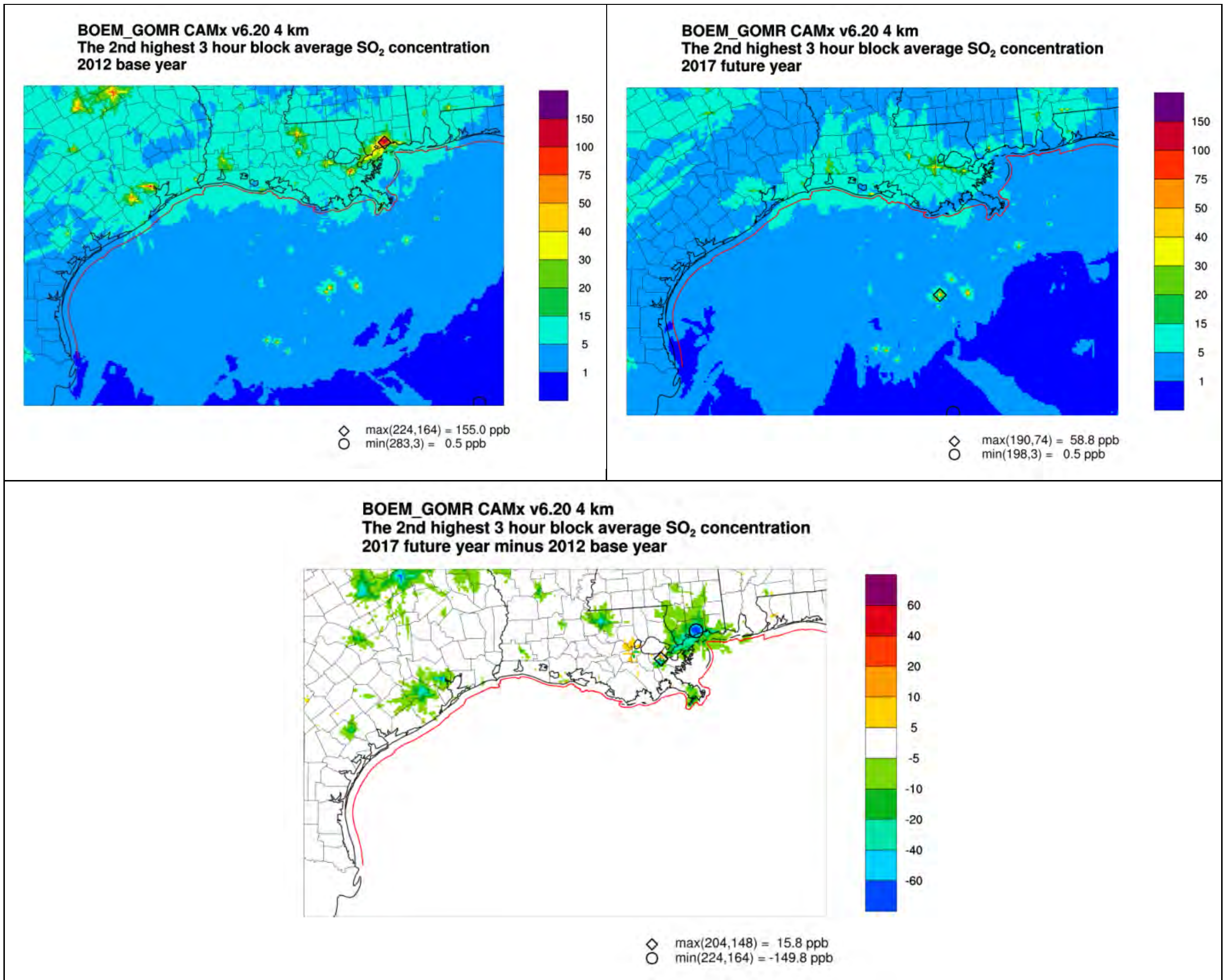


Figure H-62. Modeled Annual 2nd Highest Block 3-hour SO_2 Concentrations for the Base Year (top left), Future Year (top right), and the Future – Base Difference (bottom).

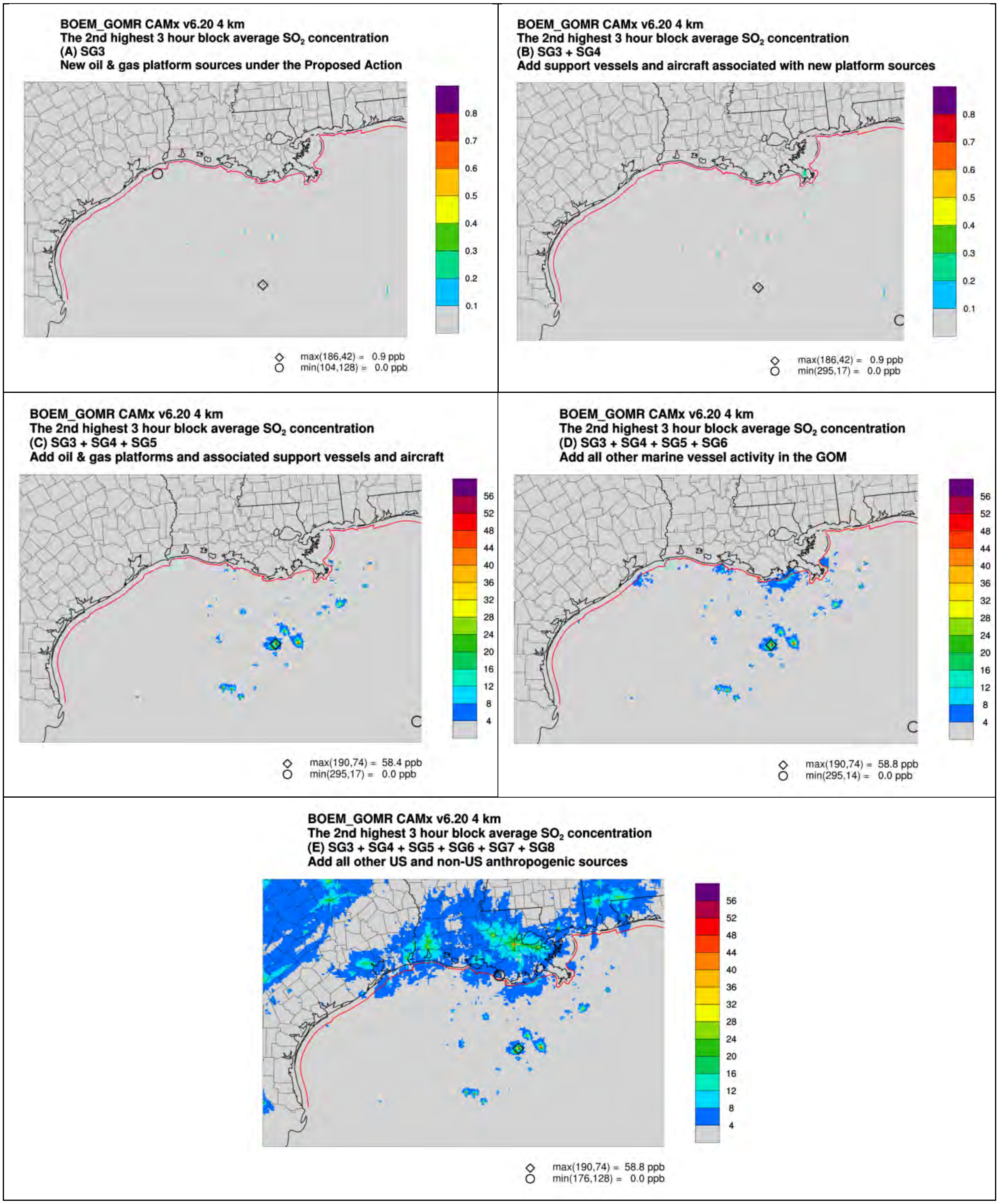


Figure H-63. Contributions of Source Group A (top left), B (top right), C (middle left), D (middle right), and E (bottom) to the Future Year All-sources 2nd Highest 3-hour Block Average SO_2 Concentration (note different color scales used in each panel).

H.7.1.5.4 CO

Results are presented here for both the 8-hour average (9 ppm) and 1-hour average (35 ppm) CO NAAQS.

Figure H-64 displays modeled 8-hour CO design values (based on the annual 2nd highest nonoverlapping running 8-hour average) for the base, future, and future-base scenarios. Similarly, **Figure H-65** displays modeled 1-hour CO design values (based on the annual 2nd highest daily maximum 1-hour average) for the base, future, and future-base scenarios. All values are below the NAAQS. The maximum predicted 8-hour design value in the future year is predicted to be 8.3 ppb at the entrance to the Freshwater Bayou Canal in Vermilion Parish, Louisiana. Differences between the base and future year scenarios are less than 3 ppm.

Individual source group contributions to CO design values were not calculated as the CAMx source apportionment methods do not include tracers for CO.

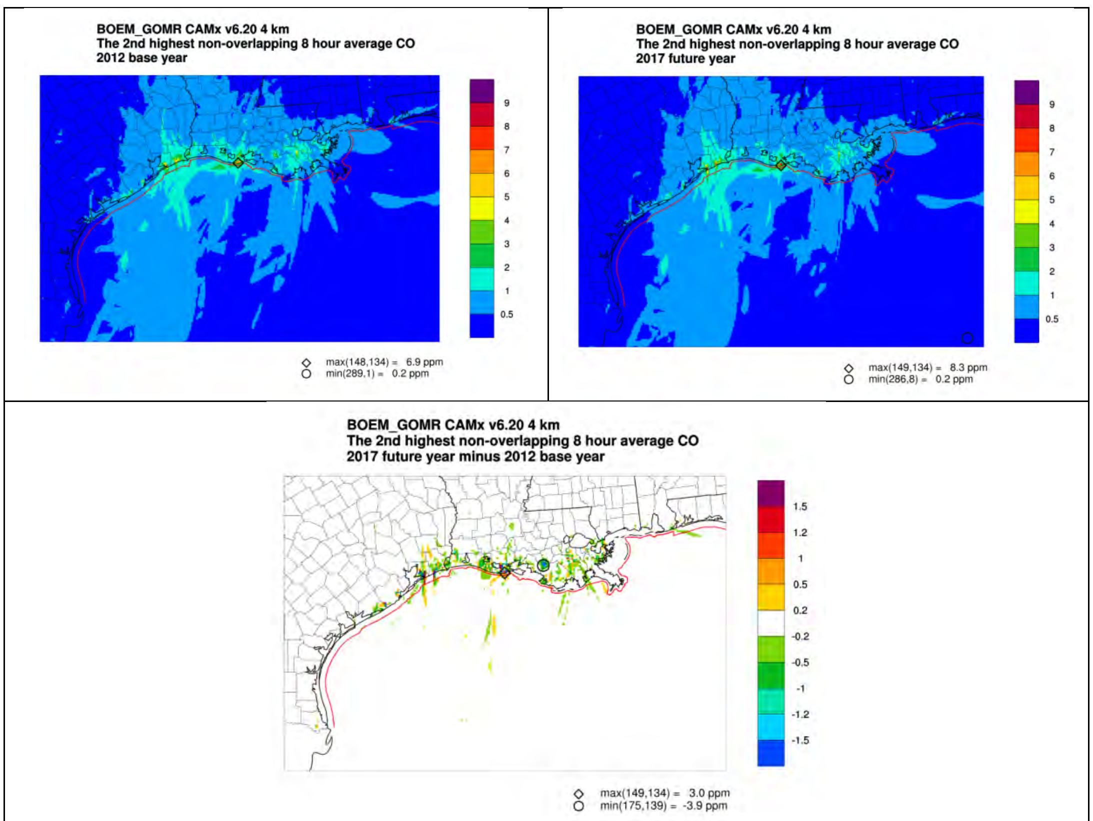


Figure H-64. Modeled Annual 2nd Highest Non-overlapping Running 8-hour Average CO Concentrations for the Base Year (top left), Future Year (top right), and the Future – Base Difference (bottom).

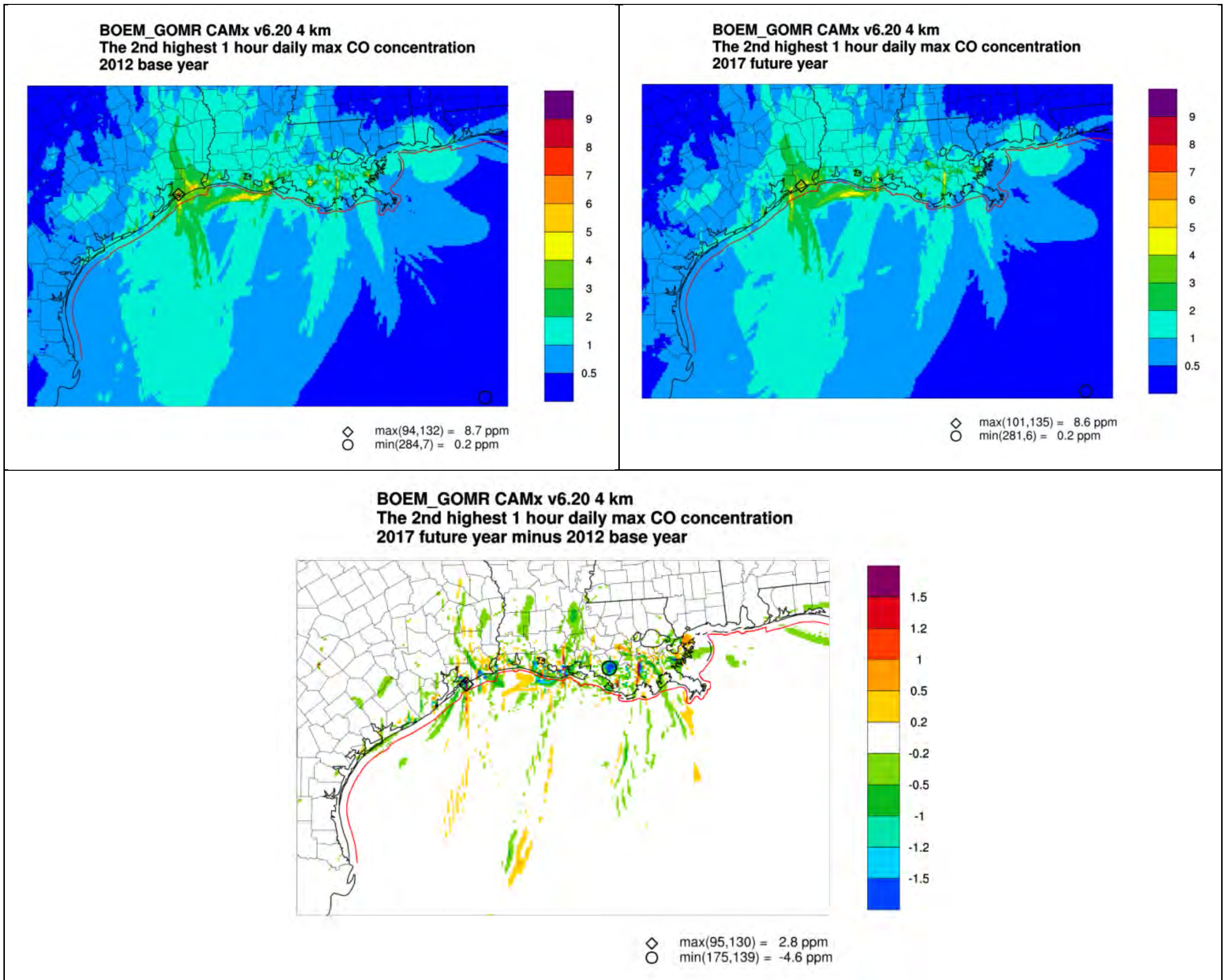


Figure H-65. Modeled Annual 2nd Highest 1-hour Average CO Concentrations for the Base Year (top left), Future Year (top right), and the Future – Base Difference (bottom).

H.7.2 PSD Increments

Incremental impacts of each source group at Class I and sensitive Class II areas were calculated for all pollutants for which PSD increments have been set (NO_2, SO_2, PM_{10}, $PM_{2.5}$). Increment consumption is based on the source group contribution calculated from the CAMx source contribution results. Increment consumption for 24-hour averages and the 3-hour average SO_2 are based on the annual second highest values. Comparisons of impacts from the 2017-2022 GOM Multisale EIS scenario with maximum allowed PSD increments are presented here as an evaluation of a “threshold of concern” for potentially significant adverse impacts, but they do not represent a regulatory PSD increment consumption analysis.

Results of the PSD increments analysis are summarized in **Table H-24** in terms of the maximum increment consumption over all Class I/II areas within the 4-km modeling domain. Maximum impacts occur at the Breton Wilderness Class I area for all PSD pollutants and averaging times. Concentration increments from Source Groups A and B are less than the maximum allowed

PSD increments for all pollutants and averaging times except for the 24-hour $PM_{2.5}$ increment from Source Group B at the Breton Wilderness Class I area where the maximum impact (2.19 µg/m^3) exceeds the Class I PSD increment (2 µg/m^3) by just under 10%. The maximum Source Group A 24-hour average $PM_{2.5}$ increment is 0.53 µg/m^3, indicating that support vessels or helicopter traffic associated with new offshore platforms, rather than emissions from the platforms themselves, are largely responsible for pushing the maximum impact above the Class I PSD increment at Breton Wilderness. The 24-hour $PM_{2.5}$ impact from Source Group B averaged over all grid cells covering the Breton Wilderness Class I area is 1.79 µg/m^3. Maximum impacts from Source Group C exceed the annual and 24-hour $PM_{2.5}$, the 24-hour PM_{10}, and the annual NO_2 Class I PSD increments at Breton Wilderness. A summary of impacts from Source Groups A, B, and C for all Class I/II areas is provided in **Table H-25**.

Table H-24. Maximum Source Group Contributions for PSD Pollutants at Class I and Sensitive Class II Areas in the 4-km Modeling Domain.

Group	Max @ Any Class I Area	Percent of PSD Class I Increment	Class I Area Where Max Occurred	Max @ Any Class II Area	Percent of PSD Class II Increment	Class II Area Where Max Occurred
PM_{10} Annual (Increment = 4 µg/m^3, 17 µg/m^3)						
A	0.04449	1.1%	Breton Wilderness	0.04196	0.2%	Gulf Islands NS
B	0.29475	7.4%	Breton Wilderness	0.35482	2.1%	Gulf Islands NS
C	1.44391	36.1%	Breton Wilderness	1.24095	7.3%	Gulf Islands NS
PM_{10} 24-Hour (Class I, II Increment = 8 µg/m^3, 30 µg/m^3)						
A	0.53529	6.7%	Breton Wilderness	0.61362	2.0%	Gulf Islands NS
B	2.19999	27.5%	Breton Wilderness	2.45061	8.2%	Gulf Islands NS
C	14.4191	180.2%	Breton Wilderness	13.9928	46.6%	Gulf Islands NS
$PM_{2.5}$ Annual (Class I, II Increment = 1 µg/m^3, 4 µg/m^3)						
A	0.04449	4.4%	Breton Wilderness	0.04196	1.0%	Gulf Islands NS
B	0.29152	29.2%	Breton Wilderness	0.34969	8.7%	Gulf Islands NS
C	1.43641	143.6%	Breton Wilderness	1.23711	30.9%	Gulf Islands NS
$PM_{2.5}$ 24-Hour (Class I, II Increment = 2 µg/m^3, 9 µg/m^3)						
A	0.53527	26.8%	Breton Wilderness	0.6136	6.8%	Gulf Islands NS
B	2.19194	109.6%	Breton Wilderness	2.44002	27.1%	Gulf Islands NS
C	14.3964	719.8%	Breton Wilderness	13.9795	155.3%	Gulf Islands NS
NO_2 Annual (Class I, II Increment = 2.5 µg/m^3, 25 µg/m^3)						
A	0.12789	5.1%	Breton Wilderness	0.14467	0.6%	Gulf Islands NS
B	0.65768	26.3%	Breton Wilderness	0.93535	3.7%	Gulf Islands NS
C	2.61628	104.7%	Breton Wilderness	1.95517	7.8%	Breton NWR
SO_2 Annual (Class I, II Increment = 2 µg/m^3, 20 µg/m^3)						
A	0.00113	0.1%	Breton Wilderness	0.00121	0.0%	Gulf Islands NS
B	0.00271	0.1%	Breton Wilderness	0.00178	0.0%	Gulf Islands NS
C	0.0684	3.4%	Breton Wilderness	0.05601	0.3%	Breton NWR
SO_2 24-Hour (Class I, II Increment = 5 µg/m^3, 91 µg/m^3)						
A	0.01009	0.2%	Breton Wilderness	0.01104	0.0%	Breton NWR
B	0.01891	0.4%	Breton Wilderness	0.0156	0.0%	Breton NWR
C	0.53913	10.8%	Breton Wilderness	0.41742	0.5%	Breton NWR

Group	Max @ Any Class I Area	Percent of PSD Class I Increment	Class I Area Where Max Occurred	Max @ Any Class II Area	Percent of PSD Class II Increment	Class II Area Where Max Occurred
SO_2 3-Hour (Class I, II Increment = 25 µg/m^3, 512 µg/m^3)						
A	0.02228	0.1%	Breton Wilderness	0.01655	0.0%	Breton NWR
B	0.03451	0.1%	Breton Wilderness	0.02296	0.0%	Breton NWR
C	1.17783	4.7%	Breton Wilderness	1.03688	0.2%	Breton NWR

NS = National Seashore; NWR = National Wildlife Refuge.

H.7.3 AQRV Impacts

H.7.3.1 Visibility

Incremental visibility impacts were calculated for each source group as well as the cumulative impact of all sources combined. The approach used the incremental concentrations as quantified by the CAMx PSAT source apportionment tool simulation for each source group. Changes in light extinction from CAMx model concentration increments due to emissions from each source group were calculated for each day at grid cells that intersect Class I and sensitive Class II areas within the 12-km modeling domain.

Calculation of incremental visibility impacts followed procedures recommended by the Federal Land Managers (FLAG, 2010) as described in **Section H.6.2.3.1**.

For each individual source group, the estimated visibility degradation at each Class I and sensitive Class II area in the 12-km modeling domain due to emissions from the source group are presented in terms of the number of days that exceed a threshold change in deciview (∆dv) relative to background conditions. The number of days with a ∆dv greater than 0.5 and 1.0 are reported.

Results of the FLAG (2010) incremental visibility impact assessment for Source Groups A and B are presented in **Table H-26 and**

Table H-27, respectively. For Source Group A, the annual 8th highest ∆dv exceed the 1.0 threshold at Breton Wilderness, Breton National Wildlife Refuge, and Gulf Islands National Seashore. Incremental impacts for Source Group B are larger and include days with the 8th highest ∆dv greater than 1.0 at Padre Island National Seashore in addition to the areas mentioned above, as well as values greater than 0.5 at Chassahowitzka Wilderness and St. Marks National Wildlife Refuge.

Table H-25. Source Group Contributions for PSD Pollutants at All Class I and Sensitive Class II Areas in the 4-km Modeling Domain.

Source Group A										
		Pollutant	NO_2 (μg/m^3)	PM_{10} (μg/m^3)		PM_{25} (μg/m^3)		SO_2 (μg/m^3)		
		Averaging Time	Annual[3]	24-hour[2]	Annual[3]	24-hour[4]	Annual[3]	3-hour[2]	24-hour[2]	Annual[3]
Class I	State	Owner	PSD Class I Increment[1]							
			2.5	8	4	2	1	25	5	2
Breton Wilderness	LA	FWS	0.128	0.535	0.044	0.535	0.044	0.022	0.010	0.001
Class II	State	Owner	PSD Class II Increment[1]							
			25	30	17	9	4	512	91	20
Breton NWR	LA	FWS	0.063	0.436	0.036	0.436	0.036	0.017	0.011	0.001
Gulf Islands NS	FL,MS	NPS	0.145	0.614	0.042	0.614	0.042	0.014	0.007	0.001
Padre Island NS	TX	NPS	0.014	0.169	0.014	0.169	0.014	0.006	0.002	0.000
Source Group B										
		Pollutant	NO_2 (μg/m^3)	PM_{10} (μg/m^3)		PM_{25} (μg/m^3)		SO_2 (μg/m^3)		
		Averaging Time	Annual[3]	24-hour[2]	Annual[3]	24-hour[4]	Annual[3]	3-hour[2]	24-hour[2]	Annual[3]
Class I	State	Owner	PSD Class I Increment[1]							
			2.5	8	4	2	1	25	5	2
Breton Wilderness	LA	FWS	0.658	2.200	0.295	2.192	0.292	0.035	0.019	0.003
Class II	State	Owner	PSD Class II Increment[1]							
			25	30	17	9	4	512	91	20
Breton NWR	LA	FWS	0.321	1.752	0.182	1.748	0.181	0.023	0.016	0.002
Gulf Islands NS	FL,MS	NPS	0.935	2.451	0.355	2.440	0.350	0.017	0.008	0.002
Padre Island NS	TX	NPS	0.181	1.013	0.166	1.012	0.165	0.006	0.003	0.001
Source Group C										
		Pollutant	NO_2 (μg/m^3)	PM_{10} (μg/m^3)		PM_{25} (μg/m^3)		SO_2 (μg/m^3)		
		Averaging Time	Annual[3]	24-hour[2]	Annual[3]	24-hour[4]	Annual[3]	3-hour[2]	24-hour[2]	Annual[3]
Class I	State	Owner	PSD Class I Increment[1]							
			2.5	8	4	2	1	25	5	2
Breton Wilderness	LA	FWS	2.616	14.419	1.444	14.396	1.436	1.178	0.539	0.068
Class II	State	Owner	PSD Class II Increment[1]							
			25	30	17	9	4	512	91	20
Breton NWR	LA	FWS	1.955	12.577	1.127	12.559	1.122	1.037	0.417	0.056
Gulf Islands NS	FL,MS	NPS	1.521	13.993	1.241	13.979	1.237	0.410	0.196	0.016
Padre Island NS	TX	NPS	0.198	2.031	0.225	2.030	0.224	0.044	0.022	0.002

NS = National Seashore; NWR = National Wildlife Refuge.
[1] The PSD demonstrations serve information purposes only and do not constitute a regulatory PSD increment consumption analysis.
[2] Based on 2nd highest 24-hour average.
[3] Annual arithmetic mean.
[4] Based on 2nd highest 24-hour average.

Table H-26. Incremental Visibility Impacts Relative to Natural Background Conditions from Source Group A.

Area	Max Δdv	8th High Δdv	No. of Days	
			>1.0	>0.5
Class I Areas				
Bandelier National Monument	0.00067	0.00016	0	0
Black Canyon of the Gunnison National Park	0.00002	0.00000	0	0
Bosque del Apache National Wildlife Refuge	0.00050	0.00018	0	0
Bosque del Apache (Chupadera Unit) Wilderness	0.00036	0.00013	0	0
Bosque del Apache (Indian Well Unit) Wilderness	0.00036	0.00014	0	0
Bosque del Apache (Little San Pascual Unit) Wilderness	0.00072	0.00023	0	0
Big Bend National Park	0.00746	0.00286	0	0
Bradwell Bay Wilderness	0.08487	0.05269	0	0
Breton Wilderness	2.65806	1.54415	22	57
Caney Creek Wilderness	0.21478	0.07569	0	0
Cape Romain Wilderness	0.08319	0.01800	0	0
Carlsbad Caverns National Park	0.00337	0.00163	0	0
Chassahowitzka Wilderness	0.26500	0.11299	0	0
Cohutta Wilderness	0.07214	0.02483	0	0
Dolly Sods Wilderness	0.01130	0.00424	0	0
Eagles Nest Wilderness	0.00009	0.00001	0	0
Everglades National Park	0.13374	0.04721	0	0
Flat Tops Wilderness	0.00002	0.00000	0	0
Great Sand Dunes National Monument	0.00020	0.00006	0	0
Great Smoky Mountains National Park	0.02866	0.01263	0	0
Guadalupe Mountains National Park	0.00283	0.00094	0	0
Hercules-Glades Wilderness	0.05899	0.02394	0	0
James River Face Wilderness	0.00768	0.00391	0	0
Joyce-Kilmer-Slickrock Wilderness	0.02655	0.00881	0	0
La Garita Wilderness	0.00013	0.00001	0	0
Linville Gorge Wilderness	0.01892	0.00436	0	0
Mammoth Cave National Park	0.04330	0.01815	0	0
Maroon Bells-Snowmass Wilderness	0.00007	0.00001	0	0
Mingo National Wildlife Refuge	0.07764	0.04615	0	0
Mount_Zirkel Wilderness	0.00002	0.00000	0	0
Okefenokee National Wildlife Refuge	0.06476	0.03510	0	0
Otter Creek Wilderness	0.01108	0.00356	0	0
Pecos Wilderness	0.00091	0.00023	0	0
Rawah Wilderness	0.00005	0.00001	0	0
Rocky Mountain National Park	0.00023	0.00003	0	0
Saint Marks National Wildlife Refuge	0.24139	0.19294	0	0
Salt Creek Wilderness	0.00278	0.00149	0	0
San Pedro Parks Wilderness	0.00038	0.00010	0	0
Shenandoah National Park	0.02361	0.00945	0	0
Shining Rock Wilderness	0.02231	0.01030	0	0
Sipsey Wilderness	0.09946	0.02484	0	0

Area	Max Δdv	8th High Δdv	No. of Days	
			>1.0	>0.5
Swanquarter National Wildlife Refuge	0.01852	0.00864	0	0
Upper Buffalo Wilderness	0.05460	0.02255	0	0
Weminuche Wilderness	0.00018	0.00002	0	0
West Elk Wilderness	0.00006	0.00001	0	0
Wheeler Peak Wilderness	0.00037	0.00012	0	0
White Mountain Wilderness	0.00085	0.00042	0	0
Wichita Mountains National Wildlife Refuge	0.02963	0.01625	0	0
Wichita Mountains (Charons Garden Unit) Wilderness	0.02932	0.01390	0	0
Wichita Mountains (North Mountain Unit) Wilderness	0.02983	0.01408	0	0
Wolf Island Wilderness	0.10444	0.02825	0	0
Class II Areas				
Breton National Wildlife Refuge	2.51391	1.44000	13	41
Gulf Islands National Seashore	3.59820	1.79194	26	64
Padre Island National Seashore	1.28497	0.44893	2	5

Table H-27. Incremental Visibility Impacts Relative to Natural Background Conditions from Source Group B.

Area	Max Δdv	8th High Δdv	No. of Days	
			>1.0	>0.5
Class I Areas				
Bandelier NM	0.00588	0.00225	0	0
Black Canyon of the Gunnison National Park	0.00027	0.00003	0	0
Bosque del Apache National Wildlife Refuge	0.00927	0.00254	0	0
Bosque del Apache (Chupadera Unit) Wilderness	0.00674	0.00173	0	0
Bosque del Apache (Indian Well Unit) Wilderness	0.00692	0.00183	0	0
Bosque del Apache (Little San Pascual Unit) Wilderness	0.01274	0.00311	0	0
Big Bend National Park	0.06000	0.03458	0	0
Bradwell Bay Wilderness	0.43077	0.29328	0	0
Breton Wilderness	7.77098	6.27094	155	256
Caney Creek Wilderness	1.37302	0.48258	1	7
Cape Romain Wilderness	0.31147	0.08130	0	0
Carlsbad Caverns National Park	0.03024	0.01639	0	0
Chassahowitzka Wilderness	1.35442	0.55791	3	9
Cohutta Wilderness	0.37888	0.12203	0	0
Dolly Sods Wilderness	0.06063	0.03063	0	0
Eagles Nest Wilderness	0.00128	0.00016	0	0
Everglades National Park	0.72032	0.18655	0	2
Flat Tops Wilderness	0.00022	0.00003	0	0
Great Sand Dunes National Monument	0.00329	0.00067	0	0
Great Smoky Mountains National Park	0.15002	0.07991	0	0
Guadalupe Mountains National Park	0.02529	0.01502	0	0
Hercules-Glades Wilderness	0.41027	0.16105	0	0
James River Face Wilderness	0.05739	0.02478	0	0

Joyce-Kilmer-Slickrock Wilderness	0.15156	0.07538	0	0
La Garita Wilderness	0.00252	0.00019	0	0
Linville Gorge Wilderness	0.10346	0.03554	0	0
Mammoth Cave National Park	0.23624	0.09683	0	0
Maroon Bells-Snowmass Wilderness	0.00103	0.00006	0	0
Mingo National Wildlife Refuge	0.44782	0.25368	0	0
Mount_Zirkel Wilderness	0.00019	0.00003	0	0
Okefenokee National Wildlife Refuge	0.40346	0.21507	0	0
Otter Creek Wilderness	0.06577	0.02996	0	0
Pecos Wilderness	0.00863	0.00303	0	0
Rawah Wilderness	0.00062	0.00016	0	0
Rocky Mountain National Park	0.00128	0.00028	0	0
Saint Marks National Wildlife Refuge	1.04546	0.79486	2	23
Salt Creek Wilderness	0.03543	0.01558	0	0
San Pedro Parks Wilderness	0.00562	0.00171	0	0
Shenandoah National Park	0.13636	0.05190	0	0
Shining Rock Wilderness	0.12422	0.06132	0	0
Sipsey Wilderness	0.47703	0.15148	0	0
Swanquarter National Wildlife Refuge	0.09369	0.04563	0	0
Upper Buffalo Wilderness	0.42865	0.16699	0	0
Weminuche Wilderness	0.00268	0.00031	0	0
West Elk Wilderness	0.00100	0.00006	0	0
Wheeler Peak Wilderness	0.00491	0.00148	0	0
White Mountain Wilderness	0.01424	0.00635	0	0
Wichita Mountains National Wildlife Refuge	0.19286	0.10693	0	0
Wichita Mountains (Charons Garden Unit) Wilderness	0.18960	0.08842	0	0
Wichita Mountains (North Mountain Unit) Wilderness	0.19390	0.09435	0	0
Wolf Island Wilderness	0.39934	0.13342	0	0
Class II Areas				
Breton National Wildlife Refuge	7.10912	4.34015	104	193
Gulf Islands National Seashore	10.54646	6.33562	198	311
Padre Island National Seashore	5.10452	3.05326	115	204

H.7.3.1.2 Cumulative Visibility Analysis

For the cumulative visibility impacts analysis, the MATS software was applied with observed PM species concentrations and monthly average relative humidity from IMPROVE monitoring sites to calculate daily visibility impairment at Class I areas from which the W20% and B20% visibility days metrics are determined as described in **Section H.7.2.3.1**. Since not all Class I areas have a co-located IMPROVE monitoring site, IMPROVE observations were mapped to nearby Class I areas that did not include an IMPROVE monitor. In **Table H-28**, the Class I area of interest is shown in the first column and the IMPROVE site used to represent observed visibility at the Class I area is shown in the third column. For example, the IMPROVE data from Dolly Sods Wilderness was used to represent observed visibility for both Dolly Sods Wilderness and Otter Creek Wilderness. The MATS includes mappings of IMPROVE site to Class I areas. However, MATS does not include a mapping for the Breton Wilderness or Bradwell Bay Class I areas and, therefore, cumulative visibility results for these areas are not included in this analysis.

Table H-28 and Table H-29 present results for the W20% visibility days, and **Table H-30 and Table** H-31 present results for the B20% visibility days. Visibility improvement between the base and future year scenarios (i.e., positive BY-FY results in **Table H-29 and Table** H-31) are seen at most Class I areas, with eight areas experiencing reductions in visibility on the W20% days. All of these areas are in New Mexico and Colorado, and Gulf of Mexico sources (Source Group D) contribute less than 0.02 dv to visibility impairment in these areas. The maximum contribution from new platforms and support vessels and helicopters associated with the 2017-2022 GOM Multisale EIS scenario (Source Group B) to any area on the W20% days is 0.04 dv at Caney Creek, Arkansas. Contributions from all Gulf of Mexico sources (Source Group D) are the greatest (0.34 dv) at St. Marks National Wildlife Refuge, Florida.

For the B20% visibility days, 11 areas experience reductions in visibility. All but one of these areas are located in New Mexico and Colorado; the lone exception is Big Bend National Park in Texas. Contributions from Gulf of Mexico sources to these 11 areas are all less than 0.01 dv. The maximum contribution from new platforms and support vessels and helicopters associated with the 2017-2022 GOM Multisale EIS (Source Group B) to any area on the B20% days is 0.01 dv, which occurs at several sites. Contributions from all Gulf of Mexico sources (Source Group D) are the greatest (0.08 dv) at St. Marks Wilderness in Florida.

Table H-28. Cumulative Visibility Results for 20% Worst Visibility Days (W20%) at Class I Areas for Base (2012) Year (BY) and Future Year (FY) Scenarios with All Sources Included and with Contributions from Each Source Group Removed.

					FY DV without Source Group				
Class I Name	State	IMPROVE Site	BY DV	FY DV	A	B	C	D	E
Bandelier NM	NM	BAND1	11.79	11.93	11.93	11.93	11.93	11.93	7.56
Big Bend NP	TX	BIBE1	16.40	16.11	16.11	16.11	16.10	16.09	11.13
Black Canyon of the Gunnison NM	CO	WEMI1	10.11	10.05	10.05	10.05	10.05	10.05	9.34
Bosque del Apache	NM	BOAP1	13.65	13.90	13.90	13.90	13.90	13.90	10.69
Caney Creek Wilderness	AR	CACR1	22.66	20.59	20.58	20.55	20.45	20.36	13.36
Carlsbad Caverns NP	TX	GUMO1	15.17	15.14	15.14	15.14	15.14	15.14	9.33
Chassahowitzka	FL	CHAS1	21.77	20.43	20.43	20.41	20.35	20.18	11.45
Cohutta Wilderness	GA	COHU1	23.94	21.11	21.11	21.11	21.09	21.06	12.89
Dolly Sods Wilderness	WV	DOSO1	23.45	19.52	19.52	19.52	19.52	19.51	14.64
Eagles Nest Wilderness	CO	WHRI1	8.81	8.72	8.72	8.72	8.72	8.72	7.84
Everglades NP	FL	EVER1	18.33	17.63	17.63	17.63	17.63	17.51	15.00
Flat Tops Wilderness	CO	WHRI1	8.81	8.72	8.72	8.72	8.72	8.72	7.84
Great Sand Dunes NM	CO	GRSA1	11.52	11.62	11.62	11.62	11.62	11.62	8.94
Great Smoky Mountains NP	TN	GRSM1	23.75	20.30	20.30	20.29	20.29	20.28	13.84
Guadalupe Mountains NP	TX	GUMO1	15.17	15.14	15.14	15.14	15.14	15.14	9.33
Hercules-Glades Wilderness	MO	HEGL1	23.50	21.48	21.47	21.46	21.42	21.37	13.21
James River Face Wilderness	VA	JARI1	23.50	20.75	20.75	20.74	20.74	20.73	16.07
Joyce-Kilmer-Slickrock Wilderness	TN	GRSM1	23.75	20.30	20.30	20.29	20.29	20.28	13.84
La Garita Wilderness	CO	WEMI1	10.11	10.05	10.05	10.05	10.05	10.05	9.34
Linville Gorge Wilderness	NC	LIGO1	22.61	19.38	19.38	19.37	19.37	19.36	13.29
Maroon Bells-Snowmass Wilderness	CO	WHRI1	8.81	8.72	8.72	8.72	8.72	8.72	7.84
Mammoth Cave NP	KY	MACA1	26.11	22.68	22.68	22.68	22.67	22.66	14.97
Mount Zirkel Wilderness	CO	MOZI1	9.33	9.20	9.20	9.20	9.20	9.20	7.25
Okefenokee	GA	OKEF1	23.31	21.99	21.99	21.98	21.93	21.87	12.62
Otter Creek Wilderness	WV	DOSO1	23.45	19.52	19.52	19.52	19.52	19.51	14.64
Pecos Wilderness	NM	WHPE1	10.04	10.10	10.10	10.10	10.10	10.10	6.73
Rawah Wilderness	CO	MOZI1	9.33	9.20	9.20	9.20	9.20	9.20	7.25
Cape Romain	SC	ROMA1	23.40	21.77	21.77	21.77	21.73	21.68	13.12
Rocky Mountain NP	CO	ROMO1	12.02	11.86	11.86	11.86	11.86	11.86	9.19

Table H-28. Cumulative Visibility Results for 20% Worst Visibility Days (W20%) at Class I Areas for Base (2012) Year (BY) and Future Year (FY) Scenarios with All Sources Included and with Contributions from Each Source Group Removed. (continued)

					FY DV without Source Group				
Class I Name	State	IMPROVE Site	BY DV	FY DV	A	B	C	D	E
Salt Creek	NM	SACR1	17.22	17.79	17.79	17.79	17.79	17.78	7.30
St. Marks	FL	SAMA1	23.01	21.18	21.18	21.16	21.06	20.84	13.43
San Pedro Parks Wilderness	NM	SAPE1	9.94	9.98	9.98	9.98	9.98	9.98	7.15
Shenandoah NP	VA	SHEN1	22.95	19.42	19.42	19.42	19.41	19.39	14.90
Shining Rock Wilderness	NC	SHRO1	21.90	18.78	18.78	18.77	18.77	18.76	12.25
Sipsey Wilderness	AL	SIPS1	23.98	21.48	21.48	21.47	21.46	21.44	13.01
Swanquarter	NC	SWAN1	22.29	20.39	20.39	20.39	20.38	20.37	13.42
Upper Buffalo Wilderness	AR	UPBU1	22.93	20.90	20.89	20.87	20.79	20.71	12.97
West Elk Wilderness	CO	WHRI1	8.81	8.72	8.72	8.72	8.72	8.72	7.84
Weminuche Wilderness	CO	WEMI1	10.11	10.05	10.05	10.05	10.05	10.05	9.34
White Mountain Wilderness	NM	WHIT1	14.24	14.60	14.60	14.60	14.59	14.59	8.15
Wheeler Peak Wilderness	NM	WHPE1	10.04	10.10	10.10	10.10	10.10	10.10	6.73
Wichita Mountains	OK	WIMO1	21.55	20.33	20.33	20.32	20.31	20.30	10.33
Wolf Island	GA	OKEF1	23.31	21.99	21.99	21.98	21.93	21.87	12.62

NM = National Monument; NP = National Park.

Table H-29. Differences in Cumulative Visibility Results for 20% Worst Visibility Days (W20%) at Class I Areas Between the Future Year (FY) and Base Year (BY) Scenarios and Contributions of Each Source Group to the Future Year Scenario Visibility.

				FY DV without Source Group				
Class I Name	State	IMPROVE Site	BYFY DV	A	B	C	D	E
Bandelier NM	NM	BAND1	-0.14	0.00	0.00	0.00	0.00	4.37
Big Bend NP	TX	BIBE1	0.29	0.00	0.00	0.01	0.02	4.98
Black Canyon of the Gunnison NM	CO	WEMI1	0.06	0.00	0.00	0.00	0.00	0.71
Bosque del Apache	NM	BOAP1	-0.25	0.00	0.00	0.00	0.00	3.21
Caney Creek Wilderness	AR	CACR1	2.07	0.01	0.04	0.14	0.23	7.23
Carlsbad Caverns NP	TX	GUMO1	0.03	0.00	0.00	0.00	0.00	5.81
Chassahowitzka	FL	CHAS1	1.34	0.00	0.02	0.08	0.25	8.98
Cohutta Wilderness	GA	COHU1	2.83	0.00	0.00	0.02	0.05	8.22
Dolly Sods Wilderness	WV	DOSO1	3.93	0.00	0.00	0.00	0.01	4.88
Eagles Nest Wilderness	CO	WHRI1	0.09	0.00	0.00	0.00	0.00	0.88
Everglades NP	FL	EVER1	0.70	0.00	0.00	0.00	0.12	2.63
Flat Tops Wilderness	CO	WHRI1	0.09	0.00	0.00	0.00	0.00	0.88
Great Sand Dunes NM	CO	GRSA1	-0.10	0.00	0.00	0.00	0.00	2.68
Great Smoky Mountains NP	TN	GRSM1	3.45	0.00	0.01	0.01	0.02	6.46
Guadalupe Mountains NP	TX	GUMO1	0.03	0.00	0.00	0.00	0.00	5.81
Hercules-Glades Wilderness	MO	HEGL1	2.02	0.01	0.02	0.06	0.11	8.27
James River Face Wilderness	VA	JARI1	2.75	0.00	0.01	0.01	0.02	4.68
Joyce-Kilmer-Slickrock Wilderness	TN	GRSM1	3.45	0.00	0.01	0.01	0.02	6.46
La Garita Wilderness	CO	WEMI1	0.06	0.00	0.00	0.00	0.00	0.71
Linville Gorge Wilderness	NC	LIGO1	3.23	0.00	0.01	0.01	0.02	6.09
Maroon Bells-Snowmass Wilderness	CO	WHRI1	0.09	0.00	0.00	0.00	0.00	0.88
Mammoth Cave NP	KY	MACA1	3.43	0.00	0.00	0.01	0.02	7.71
Mount Zirkel Wilderness	CO	MOZI1	0.13	0.00	0.00	0.00	0.00	1.95
Okefenokee	GA	OKEF1	1.32	0.00	0.01	0.06	0.12	9.37
Otter Creek Wilderness	WV	DOSO1	3.93	0.00	0.00	0.00	0.01	4.88
Pecos Wilderness	NM	WHPE1	-0.06	0.00	0.00	0.00	0.00	3.37
Rawah Wilderness	CO	MOZI1	0.13	0.00	0.00	0.00	0.00	1.95
Cape Romain	SC	ROMA1	1.63	0.00	0.00	0.04	0.09	8.65
Rocky Mountain NP	CO	ROMO1	0.16	0.00	0.00	0.00	0.00	2.67

Table H-29. Differences in Cumulative Visibility Results for 20% Worst Visibility Days (W20%) at Class I Areas Between the Future Year (FY) and Base Year (BY) Scenarios and Contributions of Each Source Group to the Future Year Scenario Visibility (continued)

				FY DV without Source Group				
Class I Name	State	IMPROVE Site	BYFY DV	A	B	C	D	E
Salt Creek	NM	SACR1	-0.57	0.00	0.00	0.00	0.01	10.49
St. Marks	FL	SAMA1	1.83	0.00	0.02	0.12	0.34	7.75
San Pedro Parks Wilderness	NM	SAPE1	-0.04	0.00	0.00	0.00	0.00	2.83
Shenandoah NP	VA	SHEN1	3.53	0.00	0.00	0.01	0.03	4.52
Shining Rock Wilderness	NC	SHRO1	3.12	0.00	0.01	0.01	0.02	6.53
Sipsey Wilderness	AL	SIPS1	2.50	0.00	0.01	0.02	0.04	8.47
Swanquarter	NC	SWAN1	1.90	0.00	0.00	0.01	0.02	6.97
Upper Buffalo Wilderness	AR	UPBU1	2.03	0.01	0.03	0.11	0.19	7.93
West Elk Wilderness	CO	WHRI1	0.09	0.00	0.00	0.00	0.00	0.88
Weminuche Wilderness	CO	WEMI1	0.06	0.00	0.00	0.00	0.00	0.71
White Mountain Wilderness	NM	WHIT1	-0.36	0.00	0.00	0.01	0.01	6.45
Wheeler Peak Wilderness	NM	WHPE1	-0.06	0.00	0.00	0.00	0.00	3.37
Wichita Mountains	OK	WIMO1	1.22	0.00	0.01	0.02	0.03	10.00
Wolf Island	GA	OKEF1	1.32	0.00	0.01	0.06	0.12	9.37

NM = National Monument; NP = National Park.

Table H-30. Cumulative Visibility Results for 20% Best Visibility Days (B20%) at Class I Areas for Base (2012) Year (BY) and Future Year (FY) Scenarios with All Sources Included and with Contributions from Each Source Group Removed.

					FY DV without Source Group				
Class I Name	State	IMPROVE Site	BY DV	FY DV	A	B	C	D	E
Bandelier NM	NM	BAND1	3.81	3.96	3.96	3.96	3.96	3.96	1.51
Big Bend NP	TX	BIBE1	5.76	5.86	5.86	5.86	5.86	5.86	3.50
Black Canyon of the Gunnison NM	CO	WEMI1	2.04	2.18	2.18	2.18	2.18	2.18	1.55
Bosque del Apache	NM	BOAP1	5.57	5.60	5.60	5.60	5.60	5.60	3.60
Caney Creek Wilderness	AR	CACR1	9.82	9.25	9.25	9.24	9.22	9.20	5.15
Carlsbad Caverns NP	TX	GUMO1	5.08	5.03	5.03	5.03	5.03	5.03	2.39
Chassahowitzka	FL	CHAS1	14.05	13.55	13.55	13.54	13.52	13.34	8.22
Cohutta Wilderness	GA	COHU1	11.47	10.59	10.59	10.59	10.59	10.58	4.62
Dolly Sods Wilderness	WV	DOSO1	9.18	8.38	8.38	8.38	8.38	8.37	5.63
Eagles Nest Wilderness	CO	WHRI1	0.48	0.39	0.39	0.39	0.39	0.39	0.00
Everglades NP	FL	EVER1	11.29	11.08	11.08	11.07	11.06	10.99	8.01
Flat Tops Wilderness	CO	WHRI1	0.48	0.39	0.39	0.39	0.39	0.39	0.00
Great Sand Dunes NM	CO	GRSA1	3.57	3.56	3.56	3.56	3.56	3.56	2.20
Great Smoky Mountains NP	TN	GRSM1	11.10	9.78	9.78	9.78	9.78	9.77	4.22
Guadalupe Mountains NP	TX	GUMO1	5.08	5.03	5.03	5.03	5.03	5.03	2.39
Hercules-Glades Wilderness	MO	HEGL1	11.29	10.84	10.84	10.84	10.83	10.82	5.94
James River Face Wilderness	VA	JARI1	12.36	11.26	11.26	11.26	11.25	11.25	7.13
Joyce-Kilmer-Slickrock Wilderness	TN	GRSM1	11.10	9.78	9.78	9.78	9.78	9.77	4.22
La Garita Wilderness	CO	WEMI1	2.04	2.18	2.18	2.18	2.18	2.18	1.55
Linville Gorge Wilderness	NC	LIGO1	9.96	9.21	9.21	9.21	9.20	9.19	4.85
Maroon Bells-Snowmass Wilderness	CO	WHRI1	0.48	0.39	0.39	0.39	0.39	0.39	0.00
Mammoth Cave NP	KY	MACA1	14.20	13.04	13.04	13.04	13.03	13.02	7.41
Mount Zirkel Wilderness	CO	MOZI1	0.89	0.79	0.79	0.79	0.79	0.79	0.00
Okefenokee	GA	OKEF1	13.40	12.89	12.89	12.89	12.88	12.85	7.58
Otter Creek Wilderness	WV	DOSO1	9.18	8.38	8.38	8.38	8.38	8.37	5.63
Pecos Wilderness	NM	WHPE1	1.09	1.24	1.24	1.24	1.24	1.24	0.00
Rawah Wilderness	CO	MOZI1	0.89	0.79	0.79	0.79	0.79	0.79	0.00
Cape Romain	SC	ROMA1	13.79	13.09	13.09	13.09	13.09	13.08	8.48
Rocky Mountain NP	CO	ROMO1	1.64	1.62	1.62	1.62	1.62	1.62	0.53
Salt Creek	NM	SACR1	7.11	7.42	7.42	7.42	7.42	7.42	2.89
St. Marks	FL	SAMA1	13.73	13.00	12.99	12.99	12.92	12.75	8.31
San Pedro Parks Wilderness	NM	SAPE1	1.30	1.37	1.37	1.37	1.37	1.37	0.61

					FY DV without Source Group				
Class I Name	State	IMPROVE Site	BY DV	FY DV	A	B	C	D	E
Shenandoah NP	VA	SHEN1	8.68	7.66	7.66	7.66	7.65	7.65	4.56
Shining Rock Wilderness	NC	SHRO1	6.58	5.81	5.80	5.80	5.79	5.79	2.03
Sipsey Wilderness	AL	SIPS1	13.10	12.20	12.20	12.19	12.16	12.13	6.79
Swanquarter	NC	SWAN1	11.76	11.09	11.09	11.08	11.08	11.08	7.45
Upper Buffalo Wilderness	AR	UPBU1	10.35	9.80	9.80	9.79	9.77	9.76	5.03
West Elk Wilderness	CO	WHRI1	0.48	0.39	0.39	0.39	0.39	0.39	0.00
Weminuche Wilderness	CO	WEMI1	2.04	2.18	2.18	2.18	2.18	2.18	1.55
White Mountain Wilderness	NM	WHIT1	3.24	3.45	3.45	3.45	3.45	3.45	1.41
Wheeler Peak Wilderness	NM	WHPE1	1.09	1.24	1.24	1.24	1.24	1.24	0.00
Wichita Mountains	OK	WIMO1	9.53	9.24	9.24	9.24	9.24	9.24	5.36
Wolf Island	GA	OKEF1	13.40	12.89	12.89	12.89	12.88	12.85	7.58

NM = National Monument; NP = National Park.

Table H-31. Differences in Cumulative Visibility Results for 20% Best Visibility Days (B20%) at Class I Areas Between the Future Year (FY) and Base Year (BY) Scenarios and Contributions of Each Source Group to the Future Year Scenario Visibility.

				Source Group Contribution to FY DV				
Class I Name	State	IMPROVE Site	BY - FY DV	A	B	C	D	E
Bandelier NM	NM	BAND1	-0.15	0.00	0.00	0.00	0.00	2.45
Big Bend NP	TX	BIBE1	-0.10	0.00	0.00	0.00	0.00	2.36
Black Canyon of the Gunnison NM	CO	WEMI1	-0.14	0.00	0.00	0.00	0.00	0.63
Bosque del Apache	NM	BOAP1	-0.03	0.00	0.00	0.00	0.00	2.00
Caney Creek Wilderness	AR	CACR1	0.57	0.00	0.01	0.03	0.05	4.10
Carlsbad Caverns NP	TX	GUMO1	0.05	0.00	0.00	0.00	0.00	2.64
Chassahowitzka	FL	CHAS1	0.50	0.00	0.01	0.03	0.21	5.33
Cohutta Wilderness	GA	COHU1	0.88	0.00	0.00	0.00	0.01	5.97
Dolly Sods Wilderness	WV	DOSO1	0.80	0.00	0.00	0.00	0.01	2.75
Eagles Nest Wilderness	CO	WHRI1	0.09	0.00	0.00	0.00	0.00	0.39
Everglades NP	FL	EVER1	0.21	0.00	0.01	0.02	0.09	3.07
Flat Tops Wilderness	CO	WHRI1	0.09	0.00	0.00	0.00	0.00	0.39
Great Sand Dunes NM	CO	GRSA1	0.01	0.00	0.00	0.00	0.00	1.36
Great Smoky Mountains NP	TN	GRSM1	1.32	0.00	0.00	0.00	0.01	5.56
Guadalupe Mountains NP	TX	GUMO1	0.05	0.00	0.00	0.00	0.00	2.64
Hercules-Glades Wilderness	MO	HEGL1	0.45	0.00	0.00	0.01	0.02	4.90
James River Face Wilderness	VA	JARI1	1.10	0.00	0.00	0.01	0.01	4.13
Joyce-Kilmer-Slickrock Wilderness	TN	GRSM1	1.32	0.00	0.00	0.00	0.01	5.56

				Source Group Contribution to FY DV				
Class I Name	State	IMPROVE Site	BY - FY DV	A	B	C	D	E
La Garita Wilderness	CO	WEMI1	-0.14	0.00	0.00	0.00	0.00	0.63
Linville Gorge Wilderness	NC	LIGO1	0.75	0.00	0.00	0.01	0.02	4.36
Maroon Bells-Snowmass Wilderness	CO	WHRI1	0.09	0.00	0.00	0.00	0.00	0.39
Mammoth Cave NP	KY	MACA1	1.16	0.00	0.00	0.01	0.02	5.63
Mount Zirkel Wilderness	CO	MOZI1	0.10	0.00	0.00	0.00	0.00	0.79
Okefenokee	GA	OKEF1	0.51	0.00	0.00	0.01	0.04	5.31
Otter Creek Wilderness	WV	DOSO1	0.80	0.00	0.00	0.00	0.01	2.75
Pecos Wilderness	NM	WHPE1	-0.15	0.00	0.00	0.00	0.00	1.24
Rawah Wilderness	CO	MOZI1	0.10	0.00	0.00	0.00	0.00	0.79
Cape Romain	SC	ROMA1	0.70	0.00	0.00	0.00	0.01	4.61
Rocky Mountain NP	CO	ROMO1	0.02	0.00	0.00	0.00	0.00	1.09
Salt Creek	NM	SACR1	-0.31	0.00	0.00	0.00	0.00	4.53
St. Marks	FL	SAMA1	0.73	0.01	0.01	0.08	0.25	4.69
San Pedro Parks Wilderness	NM	SAPE1	-0.07	0.00	0.00	0.00	0.00	0.76
Shenandoah NP	VA	SHEN1	1.02	0.00	0.00	0.01	0.01	3.10
Shining Rock Wilderness	NC	SHRO1	0.77	0.01	0.01	0.02	0.02	3.78
Sipsey Wilderness	AL	SIPS1	0.90	0.00	0.01	0.04	0.07	5.41
Swanquarter	NC	SWAN1	0.67	0.00	0.01	0.01	0.01	3.64
Upper Buffalo Wilderness	AR	UPBU1	0.55	0.00	0.01	0.03	0.04	4.77
West Elk Wilderness	CO	WHRI1	0.09	0.00	0.00	0.00	0.00	0.39
Weminuche Wilderness	CO	WEMI1	-0.14	0.00	0.00	0.00	0.00	0.63
White Mountain Wilderness	NM	WHIT1	-0.21	0.00	0.00	0.00	0.00	2.04
Wheeler Peak Wilderness	NM	WHPE1	-0.15	0.00	0.00	0.00	0.00	1.24
Wichita Mountains	OK	WIMO1	0.29	0.00	0.00	0.00	0.00	3.88
Wolf Island	GA	OKEF1	0.51	0.00	0.00	0.01	0.04	5.31

NM = National Monument; NP = National Park.

H.7.3.2 Acid Deposition

The CAMx-predicted wet and dry fluxes of sulfur- and nitrogen-containing species were processed to estimate total annual sulfur and nitrogen deposition values at each Class I and sensitive Class II area in the 12/4-km modeling domain. As described in **Section H.6.2.3.2**, the maximum annual sulfur and nitrogen deposition values from any grid cell that intersects a Class I or sensitive Class II receptor area was used to represent deposition for that area, in addition to the average annual deposition values of all grid cells that intersect a Class I or sensitive Class II receptor area. Maximum and average predicted sulfur and nitrogen deposition impacts were estimated separately for each source group and together across all source groups.

As a screening analysis, incremental deposition values in Class I/II areas for combined Source Groups A (new platforms associated with the 2017-2022 GOM Multisale EIS scenario) and B (new platforms and associated support vessels and helicopters associated with the 2017-2022 GOM

Multisale EIS scenario) were compared to the eastern and western U.S. Deposition Analysis Thresholds (DATs) listed in **Table H-32**. These DATs are specified in the FLAG guidance[25] and are further described in **Section H.6.2.3.2** above. Results of the incremental deposition analysis are summarized in **Table H-33** for Class I/II areas in the 4-km modeling domain. Deposition results were also obtained for all other sensitive areas throughout the 12 km-modeling domain, but the highest deposition values all occurred within the 4-km domain. The dividing line between the eastern and western DATs specified in the FLAG guidance is the Mississippi River, which makes sense for most locations in the U.S. but it is not necessarily clear which DAT would be most appropriate for coastal locations along the Gulf of Mexico so results are compared here against both DATs. Note that comparisons of deposition impacts from cumulative sources as represented by Source Groups C, D, E, and F to the DAT are not appropriate. Incremental nitrogen deposition exceeds the western and eastern DATs at all three locations. Incremental sulfur deposition is below the DATs in all cases except the sulfur deposition from Source Group B at Breton Wilderness and Gulf Islands National Seashore, which exceeds the western DAT but not the eastern DAT.

Table H-32. Deposition Analysis Threshold Values (kg/ha/yr) as Defined in the Federal Land Manager Guidance (FLAG, 2010).

	Nitrogen	Sulfur
East	0.010	0.010
West	0.005	0.005

Table H-33. Incremental Deposition Impacts from Source Groups A and B at Class I and Sensitive Class II Areas in the 4-km Domain.

Area		Source Group A				Source Group B			
		Nitrogen		Sulfur		Nitrogen		Sulfur	
		Max	Avg	Max	Avg	Max	Avg	Max	Avg
Breton Wilderness	Annual Deposition	0.0589	0.0501	0.0045	0.0039	0.3496	0.2701	0.0079	0.0061
	Exceeds Eastern DAT?	Yes	Yes	No	No	Yes	Yes	No	No
	Exceeds Western DAT?	Yes	Yes	No	No	Yes	Yes	Yes	Yes
Gulf Islands National Seashore	Annual Deposition	0.0909	0.0383	0.0046	0.0025	0.4560	0.2151	0.0064	0.0039
	Exceeds Eastern DAT?	Yes	Yes	No	No	Yes	Yes	No	No
	Exceeds Western DAT?	Yes	Yes	No	No	Yes	Yes	Yes	No

25 *Guidance on Nitrogen and Sulfur Deposition Analysis Thresholds* (http://www.nature.nps.gov/air/Pubs/pdf/flag/nsDATGuidance.pdf).

Area		Source Group A				Source Group B			
		Nitrogen		Sulfur		Nitrogen		Sulfur	
		Max	Avg	Max	Avg	Max	Avg	Max	Avg
Padre Island National Seashore	Annual Deposition	0.0458	0.0190	0.0012	0.0010	0.2410	0.1044	0.0019	0.0015
	Exceeds Eastern DAT?	Yes	Yes	No	No	Yes	Yes	No	No
	Exceeds Western DAT?	Yes	Yes	No	No	Yes	Yes	No	No

Cumulative deposition from all sources combined for the base case and future year scenarios were compared against applicable critical load levels in each Class I/II area for which critical loads were identified as described in **Section H.6.2.3.2**. Results are summarized in **Table** H-34. Cumulative nitrogen deposition is projected to decrease in all areas between the 2012 base case and the 2017 future year, consistent with an overall reduction in NO_x emissions. Nevertheless, maximum nitrogen deposition is modeled to continue exceeding the critical load thresholds under the future year scenario for all areas except the Padre Island National Seashore. Sulfur deposition values are lower, and larger sulfur emission reductions help to reduce sulfur deposition from above the critical load to below the critical load at Breton Wilderness, Breton National Wildlife Refuge, and Cohutta Wilderness (based on maximum grid cell values). Nevertheless, the maximum grid cell sulfur deposition still exceeds the critical load at the Gulf Islands National Seashore by a small margin.

Table H-34. Cumulative Nitrogen (N) and Sulfur (S) Deposition Impacts (kg/ha/yr) under the Base and Future Year Scenarios (shading indicates values exceeding the Critical Load threshold).

Class I/II Area	Critical Load Threshold	2012 Base Case				2017 Future Year			
		N-Max	N-Avg	S-Max	S-Avg	N-Max	N-Avg	S-Max	S-Avg
Big Bend National Park	3	3.6	2.5	2.3	1.1	3.6	2.5	2.2	1.0
Breton Wilderness	3	7.8	7.1	4.1	3.6	7.7	6.9	2.8	2.5
Breton National Wildlife Refuge	3	7.2	6.9	3.7	3.5	7.0	6.7	2.6	2.4
Gulf Islands National Seashore	3	13.8	7.0	5.3	4.4	13.0	6.7	3.6	2.9
Padre Island National Seashore	5	4.5	2.2	1.5	1.2	4.6	2.2	1.1	0.9
Bradwell Bay Wilderness	5	6.5	6.2	2.5	2.3	6.0	5.8	1.8	1.7
Saint Marks National Wildlife Refuge	3	6.8	5.2	2.5	2.0	6.2	4.7	1.8	1.5
Saint Marks Wilderness	3	6.1	4.9	2.0	1.9	5.6	4.5	1.5	1.4
Chassahowitzka Wilderness	3	6.8	6.1	2.5	2.5	6.0	5.4	1.9	1.9
Everglades National Park	5	7.5	4.7	3.9	2.2	6.9	4.5	2.4	1.7
Okefenokee National Wildlife Refuge	3	6.0	5.7	2.3	2.1	5.6	5.3	1.8	1.7
Okefenokee Wilderness	3	6.5	5.5	2.6	2.1	6.1	5.1	2.1	1.7
Wolf Island Wilderness	3	3.3	3.1	2.1	2.0	3.0	2.8	1.5	1.4

Class I/II Area	Critical Load Threshold	2012 Base Case				2017 Future Year			
		N-Max	N-Avg	S-Max	S-Avg	N-Max	N-Avg	S-Max	S-Avg
Cohutta Wilderness	5	11.5	10.2	5.4	4.3	10.6	9.3	3.6	2.9
Sipsey Wilderness	5	9.4	9.0	3.2	3.2	9.1	8.6	2.1	2.1
Guadalupe Mountains National Park	3	3.3	2.6	1.1	0.7	3.2	2.5	0.9	0.6
Wichita Mountains (Charons Garden Unit) Wilderness	5	5.6	5.6	1.7	1.7	5.4	5.4	1.5	1.5
Wichita Mountains (North Mountain Unit) Wilderness	5	6.3	6.3	1.8	1.8	6.1	6.1	1.5	1.5
Wichita Mountains National Wildlife Refuge	5	6.5	6.0	1.8	1.7	6.2	5.8	1.5	1.5
Caney Creek Wilderness	5	9.3	9.2	3.7	3.6	9.1	9.0	2.3	2.3
Upper Buffalo Wilderness	5	7.4	7.4	2.5	2.5	7.1	7.1	1.7	1.7

H.8 REFERENCES

Abt. 2014. Modeled Attainment Software, User's Manual. Abt Associates Inc., Bethesda, MD. April. Internet website: https://www3.epa.gov/ttn/scram/guidance/guide/MATS_2-6-1_manual.pdf.

Adelman, Z., U. Shanker, D. Yang, and R. Morris. 2014. Three-State Air Quality Modeling Study CAMx Photochemical Grid Model Model Performance Evaluation Simulation Year 2011. University of North Carolina at Chapel Hill and ENVIRON International Corporation, Novato, CA. November. Internet website: http://views.cira.colostate.edu/tsdw/Documents/. Accessed August 2016.

Allen, D.J., K.E. Pickering, R.W. Pinder, B.H. Henderson, K.W. Appel, and A. Prados. 2012. Impact of Lightning-NO on Eastern United States Photochemistry during the Summer of 2006 as Determined Using the CMAQ Model. Atmos. Chem. Phys. 10:107-119.

Boylan, J.W. 2004. Calculating Statistics: Concentration Related Performance Goals, paper presented at the USEPA PM Model Performance Workshop, Chapel Hill, NC. 11 February.

Boylan, J.W. and A.G. Russell. 2006. PM and Light Extinction Model Performance Metrics, Goals, and Criteria for Three-Dimensional Air Quality Models. Atmospheric Environment 40(2006):4946-4959.

Colella, P. and P.R. oodward. 1984. The Piecewise Parabolic Method (PPM) for Gas-dynamical Simulations. J. Comp. Phys. 54:174-201.

Emmons, L.K., S. Walters, P.G. Hess, J.-F. Lamarque, G.G. Pfister, D. Fillmore, C. Granier, A. Guenther, D. Kinnison, T. Laepple, J. Orlando, X. Tie, G. Tyndall, C. Wiedinmyer, S.L. Baughcum, and S. Kloster. 2010. Description and Evaluation of the Model for Ozone and Related Tracers, Version 4 (MOZART-4). Geosci. Model Dev. 3:43-67.

ENVIRON, 2012. Dallas-Fort Worth Modeling Support: Improving Vertical Mixing, Plume-in-Grid, and Photolysis Rates in CAMx. Prepared for Texas Commission on Environmental Quality. August. Internet website: http://www.tceq.state.tx.us/assets/public/implementation/air/am/contracts/reports/pm/5821110365FY1206-20120820-environ_dfw_modeling_support.pdf.

ENVIRON, 2014. CAMx User's Guide: Comprehensive Air Quality Model with Extensions, Version 6.1. ENVIRON International Corporation, Novato, CA. April.

EPRI. 2011. The Southeast Aerosol Research and Characterization Network: SEARCH. Electric Power Research Institute, Palo Alto, CA. June. Internet website: http://www.atmospheric-research.com/studies/search/SEARCHFactSheet.pdf.

FLAG. 2010. Federal Land Managers' Air Quality Related Values Work Group (FLAG) – Phase I Report – Revised (2010). Natural Resource Report NPS/NRPC/NRR – 2012/232. Internet website: http://nature.nps.gov/air/pubs/pdf/flag/FLAG_2010.pdf.

Guenther, A.B., T. Karl, P. Hartley, C. Weidinmyer, P. Palmer, and C. Geron. 2006. Estimates of Global Terrestrial Isoprene Emissions Using MEGAN (Model of Emissions of Gases and Aerosols in Nature). Atmos. Chem. Phys. 6:3181-3210.

Guenther, A.B., X. Jiang, C.L. Heald, T. Sakulyanontvittaya, T. Duhl, L.K. Emmons, and X. Wang. 2012. The Model of Emissions of Gases and Aerosols from Nature version 2.1 (MEGAN2.1): An Extended and Updated Framework for Modeling Biogenic Emissions. Geosci. Model Dev., 5, 1471-1492. doi:10.5194/gmd-5-1471-2012.

Hertel O., R. Berkowics, J. Christensen, and O. Hov. 1993. Test of Two Numerical Schemes for Use in Atmospheric Transport-Chemistry Models. Atmos. Environ. 27:2591-2611.

Hildebrandt Ruiz, L. and G. Yarwood. 2013. Interactions Between Organic Aerosol and NOy: Influence on Oxidant Production. Final Report prepared for the Texas AQRP (Project 12-012) by the University of Texas at Austin and ENVIRON International Corporation, Novato, CA. Internet website: http://aqrp.ceer.utexas.edu/projectinfoFY12_13/12-012/12-012%20Final%20Report.pdf.

Hong, S.-Y. and Y. Noh. 2006. A New Vertical Diffusion Package with an Explicit Treatment of Entrainment Processes. Monthly Weather Review 134:2318-2341.

Johnson, J., K. Bonyoung, S. Kemball-Cook, A. Wentland, J. Jung, W. Hsieh, and G. Yarwood. 2015. Photochemical Modeling of June 2012 for Northeast Texas. Ramboll Environ, December.

Karl, T.G., T.J. Christian, R.J. Yokelson, P. Artaxo, W.M. Hao, and A. Guenther. 2007. The Tropical Forest and Fire Emissions Experiment: Method Evaluation of Volatile Organic Compound Emissions Measured by PTR-MS, FTIR, and GC from Tropical Biomass Burning. Atmos. Chem. Phys. 7:5883-5897.

Kemball-Cook, S., G.Yarwood, J.Johnson, B.Dornblaser, and M.Estes. 2015. Evaluating NO_x Emission Inventories for Regulatory Air Quality Modeling Using Satellite and Air Quality Model Data. Atmos. Env. (submitted).

Koo, B., C.-J. Chien, G. Tonnesen, R. Morris, J. Johnson, T. Sakulyanontvittaya, P. Piyachaturawat, and G. Yarwood. 2010. Natural Emissions for Regional Modeling of Background Ozone and Particulate Matter and Impacts on Emissions Control Strategies. Atmos. Environ. 44:2372-2382.

Mavko, M. and R. Morris. 2013. DEASCO3 Project Updates to the Fire Plume Rise Methodology to Model Smoke Dispersion. Technical Memo prepared as part of Joint Science Form (JSP) project Deterministic and Empirical Assessment of Smoke's Contribution to Ozone. December 3. Internet website: https://wraptools.org/pdf/DEASCO3_Plume_Rise_Memo_20131210.pdf.

Morris, R.E., B. Koo, B. Wang, G. Stella, D. McNally, and C. Loomis. 2009a. Technical Support Document for VISTAS Emissions and Air Quality Modeling to Support Regional Haze State Implementation Plans. ENVIRON International Corporation, Novato, CA and Alpine Geophysics, LLC, Arvada, CO. March. Internet website: http://www.metro4-sesarm.org/vistas/data/RHR/Modeling/Reports/VISTASII_TSD_FinalReport_3-09.pdf.

Morris, R.E., B. Koo, T. Sakulyanontvittaya, G. Stella, D. McNally, C. Loomis, and T.W. Tesche. 2009b. Technical Support Document for the Association for Southeastern Integrated Planning (ASIP) Emissions and Air Quality Modeling to Support $PM_{2.5}$ and 8-Hour Ozone State Implementation Plans. ENVIRON International Corporation, Novato, CA and Alpine Geophysics, LLC, Arvada, CO. March 24. Internet website: http://www.metro4-sesarm.org/vistas/data/ASIP/Modeling/Reports/ASIP_TSD_PM25-O3_FinalRept_3.24.09.pdf.

Morris, R., C. Emery, J. Johnson, and Z. Adelman. 2012. Technical Memorandum No. 12: Sea Salt and Lightning. WRAP West-wide Jump-start Air Qualoty Modeling Study (WestJumpAQMS). June 25. Internet website: http://www.wrapair2.org/pdf/Memo_12_SeaSalt_Lightning_June25_2012_final.pdf.

Nopmongcol, O., B. Koo, L. Parker, J. Jung, and G. Yarwood. 2014. Comprehensive Air Quality Model with Extensions (CAMx) Inputs to Community Model for Air Quality (CMAQ) Inputs Converter. Final Report prepared for Jim Smith, TCEQ. August.

Sakulyanontvittaya, T., T. Duhl, C. Wiedinmyer, D. Helmig, S. Matsunaga, M. Potosnak, J. Milford, and A. Guenther. 2008. Monoterpene and sesquiterpene emission estimates for the United States. Environ. Sci. Techno. 42:1623-1629.

Sauvage, B., R.V. Martin, A. van Donkelaar, X. Liu, K. Chance, L. Jaeglé, P.I. Palmer, S. Wu, and T.M. Fu. 2007. Remote Sensed and In Situ Constraints on Processes Affecting Tropical Tropospheric Ozone. Atmos. Chem. Phys. 7:815-838.

Seinfeld, J.H. and S.N. Pandis. 1998. Atmospheric Chemistry and Physics: From Air Pollution to Climate Change. John Wiley and Sons, Inc., NY.

Simon, H., K.R. Baker, and S. Phillips. 2012. Compilation and Interpretation of Photochemical Model Performance Statistics Published Between 2006 and 2012. Atmospheric Environment 61:124-139.

Smagorinsky, J. 1963. General Circulation Experiments with the Primitive Equations: I. The Basic Experiment. Mon. Wea. Rev. 91:99-164.

Tost, H., P.J. Joeckel, and J. Lelieveld. 2007. Lightning and Convection Parameterisations - Uncertainties in Global Modeling. Atmos. Chem Phys. 7(17):4553-4568.

U.S. Dept. of the Interior, Fish and Wildlife Service and U.S. Dept. of the Interior, National Park Service. 2012. Official communication. Letter on Cumulative Visibility Metric Approach from Sandra V. Silva, Chief, Branch of Air Quality, U.S. Dept. of the Interior, Fish and Wildlife Service and Carol McCoy, Chief, Air Resource Division, U.S. Dept. of the Interior, National Park Service to Kelly Bott, Wyoming Department of Environment. February 10.

U.S. Environmental Protection Agency. 1991. Guidance for Regulatory Application of the Urban Airshed Model (UAM). U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, Research Triangle Park, NC. July. Internet website: http://www.epa.gov/ttn/scram/guidance/guide/uamreg.pdf.

U.S. Environmental Protection Agency. 2007. Guidance on the Use of Models and Other Analyses for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$, and Regional Haze. EPA-454/B-07-002, U.S. Environmental Protection Agency, Research Triangle Park, NC. April.

U.S. Environmental Protection Agency. 2014. Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, $PM_{2.5}$ and Regional Haze. U.S. Environmental Protection Agency, Research Triangle Park, NC. December. Internet website: http://www.epa.gov/ttn/scram/guidance/guide/Draft_O3-PM-RH_Modeling_Guidance-2014.pdf.

U.S. Environmental Protection Agency. 2016. Ozone designations guidance and data. Internet website: https://www3.epa.gov/airquality/greenbook/map8hr_2008.html. Accessed June 2016.

Wilson, D., R. Billings, R. Chang, H. Perez, and J. Sellers. 2014. Year 2011 Gulfwide Emissions Inventory Study. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2014-666.

Yarwood, G., T. Sakulyanontvittaya, O. Nopmongcol, and B. Koo. 2014. Ozone Depletion by Bromine and Iodine over the Gulf of Mexico. Final Report prepared for Jocelyn Mellberg, TCEQ. November.

Zhang, L., S. Gong, J. Padro, and L. Barrie. 2001. A Size-segregated Particle Dry Deposition Scheme for an Atmospheric Aerosol Module. Atmos. Environ. 35:549-560.

Zhang, L., J.R. Brook, and R. Vet. 2003. A Revised Parameterization for Gaseous Dry Deposition in Air-quality Models. Atmos. Chem. Phys. 3:2067-2082.

APPENDIX I

SPECIES NOT CONSIDERED FURTHER

I SPECIES NOT CONSIDERED FURTHER

Common Name	Scientific Name
Mammals	
Bats	
Florida bonneted bat	*Eumops floridanus*
Gray bat	*Myotis grisescens*
Indiana bat	*Myotis sodalis*
Rodents	
Anastasia Island beach mouse	*Peromyscus polionotus phasma*
Florida salt marsh vole	*Microtus pennsylvanicus dukecampbelli*
Key Largo cotton mouse	*Peromyscus gossypinus allapaticola*
Key Largo woodrat	*Neotoma floridana smalli*
Rice rat	*Oryzomys palustris natator*
Santa Rosa beach mouse	*Peromyscus polionotus leucocephalus*
Southeastern beach mouse	*Peromyscus polionotus niveiventris*
Other Mammals	
Florida panther	*Puma concolor coryi*
Gulf Coast jaguarundi	*Herpailurus yagouaroundi cacomitli*
Key deer	*Odocoileus virginianus clavium*
Louisiana black bear	*Ursus americanus luteolus*
Lower Keys marsh rabbit	*Sylvilagus palustris hefneri*
Ocelot	*Leopardus pardalis*
Puma	*Puma concolor* (all subspecies except *coryi*)
Birds	
Attwater's greater prairie-chicken	*Tympanuchus cupido attwateri*
Audubon's crested caracara	*Polyborus plancus audubonii*
Bachman's warbler	*Vermivora bachmanii*
Ivory-billed woodpecker	*Campephilus principalis*
Everglade snail kite	*Rostrhamus sociabilis plumbeus*
Florida grasshopper sparrow	*Ammodramus savannarum floridanus*
Florida scrub-jay	*Aphelocoma coerulescens*
Kirtland's warbler	*Setophaga kirtlandii*
Least tern	*Sterna antillarum*
Northern aplomado falcon	*Falco femoralis septentrionalis*
Red-cockaded woodpecker	*Picoides borealis*
Red crowned parrot	*Amazona viridigenalis*
Sprague's pipit	*Anthus spragueii*

Common Name	Scientific Name
Reptiles	
Alabama red-belly turtle	*Pseudemys alabamensis*
American alligator	*Alligator mississippiensis*
American crocodile	*Crocodylus acutus*
Atlantic salt marsh snake	*Nerodia clarkii taeniata*
Black pine snake	*Pituophis melanoleucus lodingi*
Eastern indigo snake	*Drymarchon corais couperi*
Gopher tortoise	*Gopherus polyphemus*
Ringed map turtle	*Graptemys oculifera*
Sand skink	*Neoseps reynoldsi*
Yellow-blotched map turtle	*Graptemys flavimaculata*
Amphibians	
Dusky gopher frog	*Rana sevosa*
Frosted flatwoods salamander	*Ambystoma cingulatum*
Reticulated flatwoods salamander	*Ambystoma bishopi*
Striped newt	*Notophthalmus perstriatus*
Fishes	
Alabama shad	*Alosa alabamae*
Alabama sturgeon	*Scaphirhynchus suttkusi*
Atlantic sturgeon	*Acipenser oxyrinchus oxyrinchus*
Caribbean electric ray	*Narcine bancroftii*
Dusky shark	*Carcharhinus obscurus*
Gulf sturgeon	*Acipenser oxyrinchus desotoi*
Key silverside	*Menidia conchorum*
Largetooth sawfish	*Pristis pristis*
Nassau grouper	*Epinephelus striatus*
Okaloosa darter	*Etheostoma okaloosae*
Opossum pipefish	*Microphis brachyurus lineatus*
Pallid sturgeon	*Scaphirhynchus albus*
Pearl darter	*Percina aurora*
Sand tiger shark	*Charcharias taurus*
Shortnose sturgeon	*Acipenser brevirostrum*
Smalltooth sawfish	*Pristis pectinata*
Speckled hind (grouper)	*Epinephelus drummondhayi*
Warsaw grouper	*Epinephelus nigritus*

Common Name	Scientific Name
Invertebrates	
Coral	
Ivory tree coral	*Oculina varicosa*
Pillar coral	*Dendrogyra cylindrus*
Rough cactus coral	*Mycetophyllia ferox*
Clams	
Alabama heelsplitter	*Potamilus inflatus*
Chipola slabshell	*Elliptio chipolaensis*
Choctaw bean	*Villosa choctawensis*
Fat threeridge	*Amblema neislerii*
Fuzzy pigtoe	*Pleurobema strodeanum*
Golden orb	*Quadrula aurea*
Gulf moccasinshell	*Medionidus penicillatus*
Narrow pigtoe	*Fusconaia escambia*
Ochlockonee moccasinshell	*Medionidus simpsonianus*
Oval pigtoe	*Pleurobema pyriforme*
Purple bankclimber	*Elliptoideus sloatianus*
Round ebonyshell	*Fusconaia rotulata*
Shinyrayed pocketbook	*Lampsilis subangulata*
Smooth pimpleback	*Quadrula houstonensis*
Southern kidneyshell	*Ptychobranchus jonesi*
Southern sandshell	*Hamiota australis*
Tapered pigtoe	*Fusconaia burkei*
Texas fawnsfoot	*Truncilla macrodon*
Texas pimpleback	*Quadrula petrina*
Snails	
Stock Island tree snail	*Orthalicus reses*
Insects	
Bartram's hairstreak butterfly	*Strymon acis bartrami*
Florida leafwing butterfly	*Anaea troglodyta floridalis*
Miami blue butterfly	*Cyclargus thomasi bethunebakeri*
Schaus swallowtail butterfly	*Heraclides aristodemus ponceanus*
Fungi	
Florida perforate cladonia	*Cladonia perforata*

Common Name	Scientific Name
Plants	
Ferns and Allies	
Florida bristle fern	*Trichomanes punctatum* ssp. *floridanum*
Louisiana quillwort	*Isoetes louisianensis*
Conifers and Cycads	
Florida torreya	*Torreya taxifolia*
Flowering Plants	
Aboriginal prickly-apple	*Harrisia aboriginum*
American chaffseed	*Schwalbea americana*
Apalachicola rosemary	*Conradina glabra*
Beach jacquemontia	*Jacquemontia reclinata*
Beautiful pawpaw	*Deeringothamnus pulchellus*
Big pine partridge pea	*Chamaecrista lineata keyensis*
Black lace cactus	*Echinocereus reichenbachii var. albertii*
Blodgett's silverbush	*Argythamnia blodgettii*
Britton's beargrass	*Nolina brittoniana*
Brooksville bellflower	*Campanula robinsiae*
Cape Sable thoroughwort	*Chromolaena frustrata*
Carter's small-flowered flax	*Linum carteri carteri*
Carter's mustard	*Warea carteri*
Chapman rhododendron	*Rhododendron chapmanii*
Cooley's meadowrue	*Thalictrum cooleyi*
Cooley's water-willow	*Justicia cooleyi*
Crenulate lead-plant	*Amorpha crenulata*
Deltoid spurge	*Chamaesyce deltoidea* ssp. *Deltoidea*
Etonia rosemary	Conradina etonia
Everglades bully	*Sideroxylon reclinatum* ssp. *austrofloridense*
Florida golden aster	*Chrysopsis floridana*
Florida pineland crabgrass	*Digitaria pauciflora*
Florida semaphore cactus	*Consolea corallicola*
Florida bonamia	*Bonamia grandiflora*
Florida brickell-bush	*Brickellia mosieri*
Florida prairie-clover	*Dalea carthagenensis floridana*
Florida skullcap	*Scutellaria floridana*
Four-petal pawpaw	*Asimina tetramera*
Fragrant prickly-apple	*Cereus eriophorus var. fragrans*
Garber's spurge	*Chamaesyce garberi*

Common Name	Scientific Name
Flowering Plants (continued)	
Gentian pinkroot	*Spigelia gentianoides*
Godfrey's butterwort	*Pinguicula ionantha*
Harper's beauty	*Harperocallis flava*
Johnson's seagrass	*Halophila johnsonii*
Key tree cactus	*Pilosocereus robinii*
Lakela's mint	*Dicerandra immaculata*
Lewton's polygala	*Polygala lewtonii*
Longspurred mint	*Dicerandra cornutissima*
Miccosukee gooseberry	*Ribes echinellum*
Okeechobee gourd	*Cucurbita okeechobeensis* ssp. *okeechobeensis*
Papery whitlow-wort	*Paronychia chartacea*
pigeon wings	*Clitoria fragrans*
pineland sandmat	*Chamaesyce deltoidea pinetorum*
Pygmy fringe-tree	*Chionanthus pygmaeus*
Rugel's pawpaw	*Deeringothamnus rugelii*
Sand flax	*Linum arenicola*
Scrub buckwheat	*Eriogonum longifolium* var. *gnaphalifolium*
Scrub plum	*Prunus geniculata*
Slender rush-pea	*Hoffmannseggia tenella*
Small's milkpea	*Galactia smallii*
South Texas ambrosia	*Ambrosia cheiranthifolia*
Telephus spurge	*Euphorbia telephioides*
Texas prairie dawn-flower	*Hymenoxys texana*
Texas ayenia	*Ayenia limitaris*
Tiny polygala	*Polygala smallii*
Wedge spurge	*Chamaesyce deltoidea serpyllum*
White birds-in-a-nest	*Macbridea alba*
Wide-leaf warea	*Warea amplexifolia*

APPENDIX J

STATE COASTAL MANAGEMENT PROGRAMS

J STATE COASTAL MANAGEMENT PROGRAMS

Each State's Coastal Management Program (CMP), federally approved by the National Oceanic and Atmospheric Administration (NOAA), is a comprehensive statement setting forth objectives, enforceable policies or guidelines, and standards for public and private use of land and water resources and uses in that State's coastal zone. The program provides for direct State land and water use planning and regulations. The plan also includes a definition of what constitutes permissible land uses and water uses. Federal consistency is the Coastal Zone Management Act (CZMA) requirement where Federal agency activities that have reasonably foreseeable effects on any land or water use or natural resource of the coastal zone must be consistent to the maximum extent practicable with the enforceable policies or guidelines of a coastal state's federally approved coastal management program. The latest Federal consistency regulations concerning State coastal zone management (CZM) programs are found in the *Federal Register* (2000 and 2006).

Each Gulf States' official coastal boundary can be identified from NOAA's website at https://coast.noaa.gov/czm/media/StateCZBoundaries.pdf. Once a State's CMP is federally approved, Federal agencies must ensure that their actions are consistent to the maximum extent practicable with the enforceable polices of the approved program. Federal agencies provide feedback to the States through each Section 312 evaluation conducted by NOAA.

To ensure conformance with State CMP policies or guidelines and local land use plans, the Bureau of Ocean Management (BOEM) prepares a Federal consistency determination for each proposed Outer Continental Shelf (OCS) lease sale. Through the designated State CZM agency, local land use entities are provided numerous opportunities to comment on the OCS Program. Local land-use agencies also have the opportunity to comment directly to BOEM at any time, as well as during formal public comment periods related to the announcement of the Five-Year Program, Call for Information/Notice of Intent, environmental impact statement (EIS) scoping, public hearings on the Draft EIS, and the Proposed Notice of Sale.

A State's approved CMP may also provide for the State's review of OCS plans, permits, and license activities to determine whether they will be conducted in a manner consistent with the State's CMP. This review authority is applicable to activities conducted in any area that has been leased under the OCS Lands Act (OCSLA) and that affect any land or water use or natural resource within the State's coastal zone (16 U.S.C. § 1456(c)(3)(B)).

State of Texas Coastal Management Program

The Texas Coastal Management Program (TCMP) Final EIS was published in August 1996. On December 23, 1996, NOAA approved the TCMP, and the requirements therein were made operational as of January 10, 1997. The TCMP is based primarily on the Coastal Coordination Act (CCA) of 1991 (33 Tex. Nat. Res. Code Ann. Ch. 201 *et seq.*), as amended by House Bill 3226 (1995), which calls for the development of a comprehensive coastal program based on existing statutes and regulations. The CCA established the geographic scope of the program by identifying the program's inland, interstate, and seaward boundaries. The program's seaward boundary is the

State's territorial seaward limit (3 leagues or 10.36 miles or 16.67 kilometers). The State's inland boundary is based on the State's Coastal Facilities Designation Line (CFDL). The CFDL was developed in response to the Oil Pollution Act of 1990 and basically delineates those areas within which oil spills could affect coastal waters or resources. For the purposes of the TCMP, the CFDL has been modified to capture wetlands in upper reaches of tidal waters. The geographic scope also extends upstream 200 miles (322 kilometers) from the mouths of rivers draining into coastal bays and estuaries in order to manage water appropriations on those rivers. The program's boundaries encompass all or portions of 18 coastal counties (including Cameron, Willacy, Kenedy, Kleberg, Nueces, San Patricio, Aransas, Refugio, Calhoun, Victoria, Jackson, Matagorda, Brazoria, Galveston, Harris, Chambers, Jefferson, and Orange Counties), roughly 8.9 million acres (3.6 million hectares) of land and water.

Within this coastal zone boundary, the scope of the TCMP's regulatory program is focused on the direct management of 16 generic "Areas of Particular Concern," called coastal natural resource areas (CNRAs). These CNRAs are associated with valuable coastal resources or vulnerable or unique coastal areas and include the following: waters of the open Gulf of Mexico (GOM); waters under tidal influence; submerged lands; coastal wetlands; seagrasses; tidal sand and mud flats; oyster reefs; hard substrate reefs; coastal barriers; coastal shore areas; GOM beaches; critical dune areas; special hazard areas; critical erosion areas; coastal historic areas; and coastal preserves.

The State has designated the Western Planning Area (WPA) as the geographical area in which Federal consistency shall apply outside of the coastal boundary. The TCMP also identifies Federal lands excluded from the State's coastal zone, such as U.S. Department of Defense facilities and wildlife refuges.

Land and water uses subject to the program generally include the siting, construction, and maintenance of electric generating and transmission facilities; oil and gas exploration and production; and the siting, construction, and maintenance of residential, commercial, and industrial development on beaches, critical dune areas, shorelines, and within or adjacent to critical areas and other CNRAs. Associated activities also subject to the program include canal dredging; filling; placement of structures for shoreline access and shoreline protection; on-site sewage disposal, storm-water control, and waste management for local governments and municipalities; the siting, construction, and maintenance of public buildings and public works such as dams, reservoirs, and flood control projects and associated activities; the siting, construction, and maintenance of roads, highways, bridges, causeways, airports, railroads, and nonenergy transmission lines and associated activities; certain agricultural and silvicultural activities; water impoundments and diversions; and the siting, construction, and maintenance of marinas, State-owned fishing cabins, artificial reefs, public recreational facilities, structures for shoreline access and shoreline protection, boat ramps, and fishery management measures in the GOM.

The TCMP is a networked program that is implemented primarily through 8 State agencies, 18 local governments, and the Coastal Coordination Advisory Committee (Committee). The program relies primarily on direct State control of land and water uses, although local governments will implement State guidelines related to beach and dune management. Implementation and enforcement of the coastal policies is primarily the responsibility of the networked agencies and local governments through their existing statutes, regulatory programs, or other authorizations. Networked agencies include the General Land Office/School Land Board, Texas Commission on Environmental Quality, Railroad Commission of Texas, Texas Parks and Wildlife Commission, Texas Department of Transportation, Texas Water Development Board, Texas State Soil and Water Conservation Board, and the Texas Sea Grant College Program at Texas A&M University. Other members on the Council include four gubernatorial appointees: (1) a coastal business representative; (2) an agriculture representative; (3) a local elected official; and (4) a coastal citizen. Similarly, 18 county and municipal governments, in those counties with barrier islands, are also networked entities with responsibilities for program implementation vis-a-vis beaches and dunes.

Regulations, programs, and expertise of State, Federal, and local government entities are linked to the management of Texas CNRAs in the TCMP. Local governments are notified of relevant TCMP decisions, including those that may conflict with local land-use plans or zoning ordinances. The Committee includes a local government representative as a full-voting member. An additional local government representative can be added to the Committee as a non-voting member for special local matters under review. The Committee established a permanent advisory committee to ensure effective communication for local governments with land-use authority.

In 1994, this Agency entered into a Memorandum of Understanding (MOU) with the Texas General Land Office to address similar mineral resource management responsibilities between the two entities and to encourage cooperative efforts and promote consistent regulatory practices. This MOU, which encompasses a broad range of issues and processes, outlines the responsibilities and cooperative efforts, including leasing and CZMA review processes, agreed to by the respective agencies. Effective January 10, 1997, all operators were required to submit to BOEM certificates of consistency with the TCMP for proposed operations in the WPA.

This Agency developed coordination procedures with the State for submittal of offshore lease sale consistency determinations and plans of operation. The WPA Lease Sale 168 was this Agency's first Federal action subject to State consistency review. This Agency and the State of Texas revised CZM consistency information for OCS plans, permits, and licenses to conform to the revised CZM regulations that were effective January 8, 2001, and updated on January 5, 2006, and have also incorporated streamlining improvements into the latest Notices to Lessees and Operators (NTLs) (NTLs 2008-G04, 2009-G27, and 2015-BOEM-N01). The State of Texas requires an adequate description, objective, and schedule for the project; site-specific information on the onshore support base, support vessels, shallow hazards, oil-spill response, wastes and discharges, transportation activities, and air emissions; and a Federal consistency certification, assessment, and findings. The State's requirements for Federal consistency review are based specifically on U.S. Department of the Interior's (DOI's) regulations at 30 CFR parts 250, 254, 256, and 550, and NOAA's Federal consistency regulations at 15 CFR part 930. This Agency will be continuing a dialogue with the State of Texas on reasonably foreseeable coastal effects for pipelines and other permits, and the result of these discussions will be incorporated into future updates of this Agency's NTLs and/permitting procedures.

State of Louisiana, Office of Coastal Management

The statutory authority for Louisiana's coastal zone management program, the Louisiana Office of Coastal Management (LOCM), is the State and Local Coastal Resources Management Act of 1978 *et seq*. (Louisiana Administrative Code, Volume 17, Title 43, Chapter 7, Coastal Management, June 1990 revised). The State statute puts into effect a set of State coastal policies and coastal use guidelines that apply to coastal land and water use decisionmaking. A number of existing State regulations are also incorporated into the program, including those concerning oil and gas and other mineral operations; leasing of State lands for mineral operations and other purposes; hazardous waste and radioactive materials; management of wildlife, fish, other aquatic life, and oyster beds; endangered species; air and water quality; and the Louisiana Superport.

The State statute also authorized establishment of Special Management Areas. Included as Special Management Areas are the Louisiana Offshore Oil Port (LOOP) and the Marsh Island Wildlife Refuge. For purposes of the CZMA, only that portion of LOOP within Louisiana's coastal zone is part of the Special Management Area. In April 1989, the Louisiana Legislature created the Wetlands Conservation and Restoration Authority and established a Wetlands Conservation and Restoration Trust Fund to underwrite restoration projects. The Legislature also reorganized part of the Louisiana Department of Natural Resources (LDNR) by creating the Office of Coastal Restoration and Management.

Local governments (parishes) may assume management of uses of local concern by developing a local coastal program consistent with the State CMP. The State of Louisiana has 10 approved local coastal management programs (Calcasieu, Cameron, Jefferson, Lafourche, Orleans, St. Bernard, St. James, Plaquemines, Terrebonne, and St. Tammany Parishes). In addition, two additional parishes, St. John the Baptist and St. Charles, have worked towards developing local coastal management programs. Eight other programs (Assumption, Iberia, Livingston, St. Charles, St. Martin, St. Mary, Tangipahoa, and Vermilion Parishes) have not been formally approved by NOAA. The parish planning and/or permits offices often serve as the permitting agency for projects limited to local concern. Parish-level programs, in addition to issuing permits for uses of local concern, also function as a commenting agency to Louisiana's CZM agency, the LOCM, regarding permitting of uses of State concern.

Appendix C2 of the LOCM outlines the rules and procedures for the State's local CMP. Under the LOCM, parishes are authorized, though not required, to develop local CMPs. Approval of these programs gives parishes greater authority in regulating coastal development projects that entail uses of local concern. Priorities, objectives, and policies or guidelines of local land use plans must be consistent with the policies and objectives of Act 361, the LOCM, and the State guidelines, except for a variance adopted in Section IV.D of Appendix C2 of the LOCM. The Secretaries of LDNR and Wildlife and Fisheries may jointly rule on an inconsistent local program based on local environmental conditions or user practices. State and Federal agencies review parish programs before they are adopted.

The coastal use guidelines are based on seven general policies or guidelines. State concerns that could be relevant to an OCS lease sale and its possible direct effects or associated facilities and nonassociated facilities are (a) any dredge and fill activity that intersects more than one waterbody, (b) projects involving the use of State-owned lands or water bottoms, (c) national interest projects, (d) pipelines, and (e) energy facility siting and development. Some coastal activities of concern that could be relevant to a lease sale include wetland loss due to channel erosion from OCS traffic; activities near reefs and topographic highs; activities that might affect endangered, threatened, or commercially valuable wildlife; and potential socioeconomic impacts due to offshore development. Secondary and cumulative impacts to coastal resources such as onshore facility development, cumulative impacts from infrastructure development, salt intrusion along navigation channels, etc. are also of particular concern.

Effective August 1993, the LOCM required that any entity applying for permits to conduct activities along the coast must notify the landowner of the proposed activity. An affidavit must also accompany any permit application. Through this regulation, the State strives to minimize coastal zone conflicts.

This Agency and the State of Louisiana revised CZM consistency information for OCS plans, permits, and licenses to conform to the revised CZM regulations that were effective January 8, 2001, and updated on January 5, 2006, and have also incorporated streamlining improvements into the latest NTLs (NTLs 2008-G04, 2009-G27, and 2015-BOEM-N01). Federal consistency for right-of-way (ROW) pipelines is addressed in NTL 2007-G20. The State of Louisiana requires an adequate description, objective, and schedule for the project. Also, the State requires site-specific information on the onshore support base, support vessels, shallow hazards, oil-spill response, wastes and discharges (including any disposal of wastes within the State coastal zone and waters and municipal, parish, or State facilities to be used), transportation activities, air emissions, and secondary and cumulative impacts; and a Federal consistency certification, assessment, and findings. In addition, the State receives consistency reviews on a case-by-case basis for decommissioning activities within OCS Significant Sediment Blocks that the State utilizes marine mineral resources for restoration projects. The State requirements for Federal consistency review are based specifically on DOI's regulations at 30 CFR parts 250, 254, 256, and 550, and NOAA's Federal consistency regulations at 15 CFR part 930. BOEM is continuing a dialogue with the State of Louisiana on reasonably foreseeable coastal effects associated with pipelines and other permits, and the result of these discussions will be incorporated into future updates of the Bureau of Ocean Energy Management's NTLs and/or permitting procedures.

State of Mississippi Coastal Program

The Mississippi Coastal Program (MCP) is administered by the Mississippi Department of Marine Resources. The MCP is built around several enforceable goals that promote comprehensive management of coastal resources and encourage a balance between environmental protection/preservation and development in the coastal zone. The primary coastal management statute is the Coastal Wetlands Protection Law. Other major features of the MCP include statutes related to fisheries, air and water pollution control, surface and groundwater, cultural resources, and the disposal of solid waste in marine waters. The Department of Marine Resources, the Department of Environmental Quality, and the Department of Archives and History are identified collectively as the "coastal program agencies." Mississippi manages coastal resources by regulation and by promoting activities that use resources in compliance with the MCP. The State developed a coastal wetlands use plan, which includes designated use districts in coastal wetlands and Special Management Area Plans that steer development away from fragile coastal resources and help to resolve user conflicts.

For the purposes of the coastal program, the coastal zone encompasses the three coastal counties of Hancock, Harrison, and Jackson and all coastal waters. The Mississippi coast has 359 miles (594 kilometers) of shoreline, including the coastlines of offshore barrier islands (Cat, Ship, Horn, and Petit Bois Islands). According to NOAA, there are no approved local CMPs for the State of Mississippi. The Southern Mississippi Planning and Development District serves in an advisory capacity to the State coastal agencies.

This Agency developed coordination procedures with the State for submittal of offshore lease sale consistency determinations and plans of operation. This Agency and the State of Mississippi revised CZM consistency information for OCS plans, permits and licenses to conform to the revised CZM regulations that were effective January 8, 2001, and updated on January 5, 2006, and have also incorporated streamlining improvements into the latest NTLs (NTLs 2008-G04, 2009-G27, and 2015-BOEM-N01). Federal consistency for ROW pipelines is addressed in NTL 2007-G20. The State of Mississippi requires an adequate description, objective, and schedule for the project; site-specific information on the onshore support base, support vessels, shallow hazards, oil-spill response, wastes and discharges, transportation activities, and air emissions; and a Federal consistency certification, assessment, and findings. The State requirements for Federal consistency review are based specifically on DOI's regulations at 30 CFR parts 250, 254, 256, and 550, and NOAA's Federal consistency requirements at 15 CFR part 930. BOEM is continuing a dialogue with the State of Mississippi on reasonably foreseeable coastal effects associated with pipelines and other permits, and the result of these discussions will be incorporated into future updates of the Bureau of Ocean Energy Management's NTLs and/or permitting procedures.

State of Alabama Coastal Area Management Program

The Alabama Coastal Area Act (ACAA) provides statutory authority to review all coastal resource uses and activities that have a direct and significant effect on the coastal area. The Alabama Department of Conservation and Natural Resources (ADCNR) Lands Division, Coastal Section Office, the lead coastal management agency, is responsible for the management of the State's coastal resources through the Alabama Coastal Area Management Program (ACAMP). The ADCNR is responsible for the overall management of the program, including fiscal and grants management and public education and information. The department also provides planning and technical assistance to local governments and financial assistance to research facilities and units of local government when appropriate. The State Lands Division, Coastal Section, also has authority over submerged lands in regard to piers, marinas, bulkheads, and submerged land leases.

The Alabama Department of Environmental Management (ADEM) is responsible for coastal area permitting, regulatory, and enforcement functions. Most programs of ADCNR Coastal Section that require environmental permits or enforcement functions are carried out by the ADEM with the exception of submerged land issues. The ADEM has the responsibility of all permit, enforcement, regulatory, and monitoring activities, and the adoption of rules and regulations to carry out the ACAMP. The ADEM must identify specific uses or activities that require a State permit to be consistent with the coastal policies noted above and the more detailed rules and regulations promulgated as part of the ACAMP. Under the ACAA, State agency activities must be consistent with ACAMP policies and ADEM findings. Further, ADEM must make a direct permit-type review for uses that are not otherwise regulated at the State level. The ADEM also has authority to review local government actions and to assure that local governments do not unreasonably restrict or exclude uses of regional benefit. Ports and major energy facilities are designated as uses of regional benefit. The ADCNR Lands Division manages all lease sales of State submerged bottomlands and regulates structures placed on State submerged bottomlands.

Local governments have the option to participate in the ACAMP by developing local codes, regulations, rules, ordinances, plans, maps, or any other device used to issue permits or licenses. If these instruments are certified to be consistent with ACAMP, ADEM may allow the local government to administer them by delegating its permit authority, thereby eliminating the need for ADEM's case-by-case review.

The South Alabama Regional Planning Commission provides ongoing technical assistance to ADCNR for Federal consistency, clearinghouse review, and public participation procedures. Uses subject to the Alabama's CZM program are divided into regulated and nonregulated categories. Regulated uses are those that have a direct and significant impact on the coastal areas. These uses either require a State permit or are required by Federal law to be consistent with the management program. Uses that require a State permit must receive a certificate of compliance. Nonregulated uses are those activities that have a direct and significant impact on the coastal areas that do not require a State permit or Federal consistency certification. Nonregulated uses must be consistent with ACAMP and require local permits to be administered by ADEM.

This Agency developed coordination procedures with the State for submittal of offshore lease sale consistency determinations and plans of operation. This Agency and the State of Alabama have revised CZM consistency information for OCS plans, permits, and licenses to conform to the revised CZM regulations that were effective January 8, 2001, and updated on January 5, 2006, and have also incorporated streamlining improvements into the latest NTLs (NTLs 2008-G04, 2009-G27, and 2015-BOEM-N01). Federal consistency for ROW pipelines is addressed in NTL 2007-G20. The State of Alabama requires an adequate description, objective, and schedule for the project; site-specific information on the onshore support base, support vessels, shallow hazards, oil-spill response, wastes and discharges, transportation activities, and air emissions; and a Federal consistency certification, assessment, and findings. The State's requirements for Federal consistency review are based specifically on DOI's regulations at 30 CFR parts 250, 254, 256, and 550, and NOAA's Federal consistency requirements at 15 CFR part 930. BOEM is continuing a dialogue with the State of Alabama on reasonably foreseeable coastal effects associated with pipelines and other permits, and the result of these discussions will be incorporated into future updates of Bureau of Ocean Energy Management's NTLs and/or permitting procedures.

State of Florida Coastal Management Program

For purposes of the CZMA, the State of Florida's coastal zone includes the area encompassed by the State's 67 counties and its territorial seas. Lands owned by the Federal Government and the Seminole and Miccosukee Indian tribes are not included in the State's coastal zone; however, Federal activities in or outside the coastal zone, including those on Federal or Tribal lands, that affect any land or water or natural resource of the State's coastal zone are subject to review by Florida under the CZMA. The Florida Coastal Management Act, codified as Chapter 380, Part II, Florida Statutes, authorized the development of a coastal management program. In 1981, the Florida Coastal Management Program (FCMP) was approved by NOAA.

The policies identified by the State of Florida as being enforceable in the FCMP are the 24 chapters that NOAA approved for incorporation in the State's program. The 2011 Florida Statutes are the most recent version approved by NOAA and include the listing of OCSLA permits under Subpart E and the addition of draft EAs and EISs as necessary data and information for Federal consistency review

A network of eight State agencies and five regional water management districts implement the FCMP's 24 statutes. The water management districts are responsible for water quantity and quality throughout the State's watersheds. The State agencies include the following: the Department of Environmental Protection (DEP), the lead agency for the FCMP and the State's chief environmental regulatory agency and steward of its natural resources; the Department of Community Affairs, which serves as the State's land planning and emergency management agency; the Department of Health, which, among other responsibilities, regulates on-site sewage disposal; the Department of State, Division of Historical Resources, which protects historic and archaeological resources; the Fish and Wildlife Conservation Commission, which protects and regulates fresh and saltwater fisheries, marine mammals, and birds and upland species, including protected species and the habitat used by these species; the Department of Transportation, which is charged with the development, maintenance, and protection of the transportation system; the Department of Agriculture and Consumer Services, which manages State forests and administers aquaculture and mosquito control programs; and the Governor's Office of Planning and Budget, which plays a role in the comprehensive planning process.

Effective July 1, 2000, the Governor of Florida assigned the State's responsibilities under the OCSLA to the Secretary of the Florida DEP. The DEP's Office of Intergovernmental Programs coordinates the review of OCS plans with FCMP member agencies to ensure that the plan is consistent with applicable State enforceable policies and the Governor's responsibilities under the Act.

This Agency developed coordination procedures with the State for the submittal of offshore lease sale consistency determinations and plans of operation. In 2003, this Agency and the State revised CZM consistency information for OCS plans, permits, and licenses to conform with the revised CZM regulations that were effective on January 8, 2001, and updated on January 5, 2006, and they have also incorporated streamlining improvements into the latest NTLs (NTLs 2008-G04, 2009-G27, and 2015-BOEM-N01). Federal consistency for ROW pipelines is addressed in NTL 2007-G20.

The State of Florida requires an adequate description, objective, and schedule for all activities associated with a project; specific information on the natural resources potentially affected by the proposed activities; and specific information on onshore support base, support vessels, shallow hazards, oil-spill response, wastes and discharges, transportation activities, and air emissions; and a Federal consistency certification, assessment, and findings. As identified by the State of Florida, the State enforceable policies that must be addressed for OCS oil- and gas-related activities are found at http://www.boem.gov/CZM-Program-Policies-for-GOM-States.aspx. These requirements have been incorporated into the Plans and Regional Oil-Spill Response NTLs. The State requirements for Federal consistency review are based on the requirements of State statutes, CZMA regulations at 15 CFR part 930, and DOI's regulations at 30 CFR parts 250, 254, 256, and 550. BOEM is continuing a dialog with the State of Florida on reasonably foreseeable coastal effects associated with OCS plans, pipelines, and other permits; the result of these discussions will be incorporated into future updates of the Bureau of Ocean Energy Management's NTLs and/or permitting procedures.

REFERENCES

Federal Register. 2000. Coastal Zone Management Act federal consistency regulations. Final rule. 65 FR 237, pp. 77124-77175, December 8, 2000.

Federal Register. 2006. Coastal Zone Management Act federal consistency regulations. Final rule. 71 FR 3, pp. 788-831, January 5, 2006.

APPENDIX K

CONSULTATION CORRESPONDENCE

K CONSULTATION CORRESPONDENCE

United States Department of the Interior

BUREAU OF OCEAN ENERGY
MANAGEMENT, REGULATION, AND ENFORCEMENT

Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

In Reply Refer To: MS 5430

JUL 30 2010

Dr. Roy E Crabtree, Ph.D.
Regional Administrator
Southeast Region
National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, Florida 33701

Dear Dr. Crabtree,

The Bureau of Offshore Energy Management, Regulation, and Enforcement (BOEM; formerly the Minerals Management Service) requests that the National Marine Fisheries Service (NMFS) reinitiate consultation (based on the existing consultation and resulting Biological Opinion (BO) dated June 29, 2007) under Section 7 of the Endangered Species Act (ESA) of 1973 on the effects of the Five-Year Outer Continental Shelf Oil and Gas Leasing Program (2007-2012) in the Central and Western Planning Areas of the Gulf of Mexico. This request is in response to the Deepwater Horizon (DWH) incident and is meant to comply with 50 CFR § 402.16.

BOEM believes the DWH incident and the resulting oil spill necessitate this reinitiation action. We understand the oil spill and the associated impacts to listed species and designated critical habitat cannot be fully quantified at this time and that some potentially relevant information will not be available until after NMFS completes its emergency response consultations under the ESA. However, we acknowledge that the spill volumes and scenarios used in the analysis for the existing NMFS BO need to be readdressed given the "rare event" of a spill exceeding 420,000 gallons as referenced in the current NMFS BO has occurred and that affects to and the status of some listed species or designated critical habitats may have been altered as a result of the DWH incident and therefore require further consideration.

We also recognize that both NMFS and BOEM will need to agree upon an extended consultation timeframe in order to allow for NMFS to first complete the emergency response consultations and re-establish the environmental baseline. Further, we recognize that oil spill response efforts have required and may continue to require much of the NMFS's resources. We ask that you provide us an initial estimate on a consultation timeframe. We understand, however, that this timeframe may be adjusted depending on the timing and outcome of the aforementioned actions.

DOI 004484

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We will consider the existing NMFS BO to remain in effect until the reinitiated consultation is completed and a new BO is available. In the interim, BOEM will continue to comply with all Reasonable and Prudent Measures and their Terms and Conditions under this existing BO along with implementing the current BOEM-imposed mitigation, monitoring and reporting requirements. In addition, BOEM will continue to institute the BO's Conservation Recommendations, such as pile driving noise characterization, standardization of observer qualifications and protocols, reduction of marine debris, and general scientific research efforts on the effects of oil and gas activities on listed species and designated critical habitat. Based on the most recent and best available information at the time, BOEM will also continue to closely evaluate and assess risks to listed species and designated critical habitat in upcoming environmental compliance documentation under the National Environmental Policy Act and other statutes. Further, BOEM will continue to provide NMFS with any additional information relevant to this ESA Section 7 consultation reinitiation if and when it becomes available.

We look forward to working with NMFS during this formal consultation reinitiation process. If you have any questions or require any additional information, please contact Deborah Epperson, Protected Species Biologist, Leasing and Environment Division, Deborah.Epperson@mms.gov or 504-736-3257.

Sincerely,

Joseph A. Christopher
Regional Supervisor

United States Department of the Interior

BUREAU OF OCEAN ENERGY
MANAGEMENT, REGULATION, AND ENFORCEMENT

Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

In Reply Refer To: MS 5430

JUL 30 2010

Mr. James Boggs, Field Supervisor
Louisiana Field Office
U.S. Fish and Wildlife Service
646 Cajundome Boulevard, Suite 400
Lafayette, Louisiana 70506-4290

Dear Mr. Boggs,

The Bureau of Offshore Energy Management, Regulation, and Enforcement (BOEM; formerly the Minerals Management Service) requests that the Fish and Wildlife Service (FWS) reinitiate consultation (based on the existing consultation dated September 14, 2007) under Section 7 of the Endangered Species Act (ESA) of 1973 on the effects of the Five-Year Outer Continental Shelf Oil and Gas Leasing Program (2007-2012) in the Central and Western Planning Areas of the Gulf of Mexico. This request is in response to the Deepwater Horizon (DWH) incident and is meant to comply with 50 CFR § 402.16.

The existing consultation was completed using the informal consultation process and found that this program was not likely to adversely affect listed species or designated critical habitats. The FWS provided its written concurrence with that determination in a letter to BOEM dated September 14, 2007. At this time, BOEM believes the DWH incident and the resulting oil spill necessitate reconsideration of this ESA consultation. We understand the oil spill and the associated impacts to listed species and designated critical habitat cannot be fully quantified at this time and that some potentially relevant information will not be available until after the FWS completes its emergency response consultations under the ESA. However, we acknowledge that the spill volumes and scenarios used in the analysis for the existing FWS consultation need to be readdressed given the "rare event" of a spill exceeding 420,000 gallons as referenced in the current NMFS BO has occurred and that affects to and the status of some listed species or designated critical habitats may have been altered as a result of the DWH incident and therefore require further consideration.

We also recognize that both FWS and BOEM will need to agree upon an extended consultation timeframe in order to allow for FWS to first complete the emergency response consultations and re-establish the environmental baseline. Further, we recognize that oil spill response efforts have required and may continue to require much of the FWS's resources. We ask that you provide us an initial estimate on a consultation timeframe. We understand, however, that this timeframe may be adjusted depending on the timing and outcome of the aforementioned actions.

We will consider the existing consultation to remain in effect until the reinitiated consultation is completed. In the interim, BOEM will continue to comply with all mitigation, monitoring and reporting measures incorporated into the September 14, 2007 consultation by FWS. Based on the most recent and best available information at the time, BOEM will also continue to closely evaluate and assess risks to listed species and designated critical habitat in upcoming environmental compliance documentation under the National Environmental Policy Act and other statutes. Further, BOEM will continue to provide FWS with any additional information relevant to this ESA Section 7 consultation request if and when it becomes available.

We look forward to working with FWS during this consultation reinitiation process. If you have any questions or require any additional information, please contact Deborah Epperson, Protected Species Biologist, Leasing and Environment Division, Deborah.Epperson@mms.gov or 504-736-3257.

Sincerely,

Joseph A. Christopher
Regional Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
1875 Century Boulevard
Atlanta, Georgia 30345

In Reply Refer To:
FWS/R4/ES

SEP 27 2010

Joseph A. Christopher
Regional Supervisor
Bureau of Ocean Energy Management, Regulation and Enforcement
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

RE: MS-5430, Request to Reinitiate Consultation under Section 7 of the Endangered Species Act of 1973 on the Effects of the Five-Year Outer Continental Shelf Oil and Gas Leasing Program (2007-2012) in the Central and Western Planning Areas of the Gulf of Mexico in Response to the Deepwater Horizon Incident.

Dear Mr. Christopher:

The U.S. Fish and Wildlife Service (Service) received the subject request dated July 30, 2010 on August 4, 2010. We concur with your assessment that at this time the Deepwater Horizon incident and the resulting oil spill necessitate reconsideration of the existing consultation dated September 14, 2007, and concluded informally. The incident and resulting oil spill represent new information regarding potential adverse affects to endangered and threatened species that has not previously been assessed. Furthermore, the status of some listed species or designated critical habitats may have been altered as a result of the Deepwater Horizon incident and therefore require further consideration.

As acknowledged in your letter, the Service is fully engaged in oil spill response efforts, which continues to require much of our resources. We are engaged in emergency section 7 consultations with the Coast Guard, U.S. Army Corps of Engineers as well as other federal agencies to minimize the adverse effects of oil spill response efforts on listed species. Once the emergency response efforts cease we will be able to conclude emergency response consultations. Only after we have fully assessed the effects of response actions, as well as the released oil, can we begin to effectively re-assess the effects of the five-year outer continental shelf oil and gas leasing program (2007-2012) in the central and western planning areas of the Gulf of Mexico, as these steps will be necessary to re-establish the environmental baseline of species and habitat status.

At this time it is difficult to predict a timeframe for completion of the aforementioned actions and emergency consultations. Current response activities and level of resource commitment to the response are expected to continue through early December when response activities may be reduced. It may be timely to hold a meeting to discuss the consultation process and timelines after the first of the year.

TAKE PRIDE IN AMERICA

Mr. Christopher 2

As you have identified, the potential spill volumes and scenarios used in the analysis for the existing consultation do need to be re-addressed given the "rare event" of a spill exceeding 420,000 gallons. We encourage the Bureau to conduct additional modeling to address this scenario and its potential effects on listed species and their designated critical habitats. Additional discussion as to the specifics of the modeling, as well as other information relevant to the consultation should be discussed at a future meeting. Please contact Deborah Fuller (337) 291-3124 at the Lafayette, Louisiana Field Office to schedule a meeting. I look forward to discussing this further.

Sincerely,

"for" Cynthia K. Dohner
Regional Director

United States Department of the Interior

BUREAU OF OCEAN ENERGY MANAGEMENT
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

In Reply Refer To: MS 5430

FEB 03 2012

Dr. Roy E. Crabtree
Regional Administrator, Southeast Region
National Marine Fisheries Service
263 13th Avenue South
Saint Petersburg, Florida 33701

Dear Dr. Crabtree,

The purpose of this letter is to finalize the interim Endangered Species Act project-specific consultation procedures between the Bureau of Ocean Energy Management (BOEM) and the National Marine Fisheries Service (NMFS). Specifically we are responding to your December 21, 2011 rejoinder to our November 23, 2011 letter (both attached).

These interim procedures are for the Gulf of Mexico oil and gas activities covered by the NMFS June 29, 2007 biological opinion[1]. The BOEM is in the process of completing a biological assessment for a new Section 7 consultation that will supersede this agreement.

Per your request, BOEM has agreed to a 15 calendar day timeline for review of exploration plans (EP) and geological and geophysical (G&G) survey permits. The BOEM also agrees to a 30 calendar day timeline for review of development and production plans (DPP) and development operations coordination documents (DOCD).

As requested, BOEM has clarified (via telecom with NMFS-SERO staff on January 11, 2012) that relevant oil spill response plan (OSRP) information is included in EPs and DOCDs. The NMFS will not require an additional OSRP review. In the event that NMFS needs more information than what is provided in the EP or DOCD, NMFS may request the relevant Regional OSRP on a case-by-case basis.

The BOEM will provide NMFS with the requested documents for review in the following manner:

[illegible]	[illegible]	[illegible]
G&G Permits	15	1. BOEM posts public information copy on BOEM website (www.BOEM.gov). 2. BOEM sends notification email to NMFS with relevant web link. 3. NMFS provides comments to BOEM within allotted time.
EPs	15	
DPPs	30	
DOCDs	30	

The primary NMFS point of contact for review of BOEM activities will be Mr. Kyle Baker. All emails will be sent directly to him (kyle.baker@noaa.gov). The primary points of contact for BOEM will be Ms. Mimi Griffitt for EPs, DPPs, and DOCDs (michelle.griffitt@boem.gov) and Mr. John Johnson for G&G permits (john.johnson@boem.gov).

Please respond in writing if you concur with this process for interim project-specific consultation. Upon receipt of your concurrence, BOEM will begin sending all new permit/plan applications for your review.

For additional information or questions regarding these interim consultation procedures please contact Dr. Deborah Epperson at deborah.epperson@boem.gov or at (504) 736-3257.

John Rodi

John Rodi

Enclosures

cc: J. Bennett (MS 4042)

1 National Marine Fisheries Service. 2007. Endangered Species Act biological opinion on the Five-Year Outer Continental Shelf Oil and Gas Leasing Program (2007-2012) in the Central and Western Planning Areas of the Gulf of Mexico. June 29, 2007.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701-5505
727.824.5312, FAX 824.5309
http://sero.nmfs.noaa.gov

FEB 8 2012

F/SER32:KPB

Mr. John Rodi, Regional Director
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd
New Orleans, LA 70123-2394

Re: MS 5430

Dear Mr. Rodi:

This responds to your letter dated February 3, 2012, regarding interim Endangered Species Act (ESA), project-specific consultation procedures with the Bureau of Ocean Energy Management (BOEM). These procedures have been coordinated between personnel from each of our offices. I concur with the implementation of these interim procedures until a new biological opinion is completed on the BOEM/BSEE lease program for the Gulf of Mexico. I look forward to the continued cooperation between our two agencies on these important issues.

For additional coordination regarding these interim consultation procedures, please contact Kyle Baker at kyle.baker@noaa.gov or Adam Brame (adam.brame@noaa.gov) at (727) 824-5312.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

FLORIDA DEPARTMENT *of* STATE

RICK SCOTT
Governor

KEN DETZNER
Secretary of State

April 15, 2015

Mr. Douglas Jones
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

RE: DHR Project File No.: 2015-1591 / Received by DHR: April 3, 2015
10 Proposed Gulf of Mexico (GOM) Lease Sales – 2017-2022 Draft Proposed Program

Dear Mr. Jones:

Thank you for providing our office with the opportunity to comment in the early stages of the preparation of an environmental impact statement (EIS). Pursuant to 36 CFR Part 800.8, the Bureau of Ocean Energy Management (BOEM) can elect to fulfill its responsibilities under Section 106 of the National Historic Preservation Act of 1966 in coordination with the preparation of an EIS under the National Environmental Policy Act.

We concur that BOEM's proposed 2017-2022 GOM lease sales will have no effect on historic properties provided that BOEM's staff of marine archaeologists evaluates each proposed APE. This office should be notified and given the opportunity to comment should any cultural resources be identified.

If you have any questions, please contact Deena Woodward, Community Assistance Consultant, by email at *Deena.Woodward@dos.myflorida.com*, or by telephone at 850.245.6333 or 800.847.7278.

Sincerely

Robert F. Bendus, Director
Division of Historical Resources
& State Historic Preservation Officer

Jones, Douglas <douglas.jones@boem.gov>

RE: DHR project file 2015-1591

1 message

Woodward, Deena S. <Deena.Woodward@dos.myflorida.com> Tue, May 12, 2015 at 7:45 AM
To: "Jones, Douglas" <douglas.jones@boem.gov>

Hi Doug,

We are primarily interested in resources that are identified off of Florida that cannot be avoided. Let me know if you have any other questions.

Sincerely,

Deena S. Woodward

Community Assistance Consultant/Archaeologist | State Lands Compliance and Review | Bureau of Historic Preservation | Division of Historical Resources | Florida Department of State | 500 South Bronough Street | Tallahassee, Florida 32399 | 850.245.6333 | 1.800.847.7278 | Fax: 850.245.6439 | dos.myflorida.com/historical

Florida Department of State Division of Historical Resources

From: Jones, Douglas [mailto:douglas.jones@boem.gov]
Sent: Friday, May 08, 2015 10:59 AM
To: Woodward, Deena S.
Subject: DHR project file 2015-1591

Hello Ms. Woodward,

I wanted to follow up on a letter I received from your office, which was in response to our notification of BOEM's 2017-2022 Gulf of Mexico Lease Sale Draft Proposed Program. We appreciate the Florida DHR's concurrence that no historic properties will be affected; however, I wanted to seek clarification (or maybe provide it) on one other statement in your letter. It requests that your office "should be notified and given the opportunity to comment should **any** cultural resources be identified" (emphasis mine). Due to the volume of offshore oil and gas development activities, we receive site specific archaeological surveys virtually every day, and the majority

STATE OF ALABAMA
ALABAMA HISTORICAL COMMISSION
468 SOUTH PERRY STREET
MONTGOMERY, ALABAMA 36130-0900

April 30, 2015

FRANK W. WHITE
EXECUTIVE DIRECTOR

TEL: 334-242-3184
FAX: 334-240-3477

Joseph A. Christopher
Regional supervisor
Office of Environment
BOEM
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Re: AHC 2015-0778
Gulf of Mexico Lease Sales 2017-2022
GM 673E
Gulf of Mexico

Dear Mr. Christopher:

Upon review of the above referenced project, we have determined that we agree that the proposed phased approach to meeting Section 106 requirements is reasonable and appropriate for this undertaking. We look forward to working with BOEM on these future projects.

We appreciate your commitment to helping us preserve Alabama's historic archaeological and architectural resources. Should you have any questions, please contact Amanda McBride at 334.230.2692 or Amanda.McBride@preserveala.org. Have the AHC tracking number referenced above available and include it with any future correspondence.

Sincerely,

Lee Anne Wofford

Lee Anne Wofford
Deputy State Historic Preservation Officer

LAW/AMH/amh

United States Department of the Interior

BUREAU OF OCEAN ENERGY MANAGEMENT
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, LA 70123-2394

In Reply Refer To: GM 673E

APR - 3 2015

Pam Breaux
SHPO
Department of Culture, Recreation & Tourism
1051 North Third Street
Baton Rouge, Louisiana 70802

The proposed undertaking will have no adverse effect on historic properties. This effect determination could change should new information come to our attention.

Pam Breaux 5-12-15
Pam Breaux
State Historic Preservation Officer
Date

Dear Ms. Breaux:

The Bureau of Ocean Energy Management (BOEM) is pleased to initiate Section 106 consultation, as required by the National Historic Preservation Act, for the 10 proposed Gulf of Mexico (GOM) lease sales in the 2017-2022 draft proposed program. BOEM is proposing to hold one sale each in 2017 and 2022, and two sales each in 2018, 2019, 2020, and 2021. A proposed schedule of lease sales is enclosed. A multiple sale environmental impact statement (EIS) is being prepared and the draft EIS is currently in preparation.

Figure 1. Proposed Lease Sale Area

During periods that the continental shelf was exposed above sea level, the area was open to habitation by prehistoric peoples. The advent of early man into the GOM region is currently

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accepted to be around 12,000 years before the present (B.P.). The sea-level curve for the northern GOM suggests that sea level at 12,000 B.P. would have been approximately 45-60 meters (m) [148-197 feet (ft.)] below the present day sea level. On this basis, the continental shelf shoreward of the 45-60 m (148-197 ft.) bathymetric contours has potential for prehistoric sites dating after 12,000 B.P. Because of inherent uncertainties in both the depth of sea level and the entry date of prehistoric man into North America, BOEM adopted the 60 m (197 ft.) water depth as the seaward extent for archaeological site potential in the GOM. Since water depths in the Eastern Planning Area vastly exceed 60 m (197 ft.), with depths in the range between 245 m (800 ft.) and 933 m (3,062 ft.), there is no potential for the presence of submerged prehistoric archaeological sites.

Historic properties within the GOM would likely consist of historic shipwrecks. An historic shipwreck is defined as a submerged or buried vessel, at least 50 years old that has foundered, stranded, or wrecked and is presently lying on or embedded in the seafloor. This includes vessels that exist intact or as scattered components on or in the seafloor. BOEM and its predecessor agency Minerals Management Service have contracted studies in 1977, 1989, and again in 2003 that indicated the potential presence of over 3,000 historically reported shipwrecks in the GOM. This list should not be considered exhaustive; regular reporting of shipwrecks did not occur until late in the 19th century and losses of several classes of vessels, such as small coastal fishing boats were largely unreported in official records. Fifty-one confirmed historic vessels have been located in Federal waters in the GOM, two in the Western Planning Area, five in the Eastern Planning Area, and 44 in the Central Planning Area, nearly half of which have been found in deepwater blocks in Mississippi Canyon, Green Canyon, and Viosca Knoll. Nearly all of these have been discovered as a result of BOEM mandated oil industry conducted surveys. The discoveries include six early 19th century wooden sailing vessels, lying in depths between 823 m (2,700 ft.) and 1,310 m (4,300 ft.) of water, seven 19th or early 20th century sailing ships, and one 17th or 18th century wreck. There are also several World War II casualties located in deepwater off the mouth of the Mississippi River (e.g., *Alcoa Puritan, GulfPenn, GulfOil, Halo, Virginia, Robert E. Lee*, and the German submarine *U-166*). All of these wrecks have been investigated using a remotely operated vehicle from a surface vessel and are in an excellent state of preservation.

Activities associated with lease sales that have the potential to disturb offshore historic resources include: (1) use of bottom cables for seismic data collection; (2) anchoring, which may disturb host or overlying sediment; (3) emplacement and removal of bottom-founded structures; (4) exploratory drilling; and (5) trenching for and laying pipelines. The area of potential effect (APE) for these undertakings is the vertical and horizontal extent of the related seafloor disturbing activities. Historic property identification efforts under the leases issued from the proposed 2017-2022 GOM lease sales will occur in a phased approach as defined in 36 CFR 800.4.

The potential of an interaction between rig or platform emplacement and an historic property is greatly diminished by requisite site surveys. In certain circumstances, the Bureau of Safety and Environmental Enforcement Regional Director may require the preparation of an archaeological report to accompany pipeline applications under 30 CFR 250.1007(a)(5). The BOEM Regional Director has authority to require certain types of surveys before submission of an Exploration

Plan, Development and Production Plan, or Development Operations Coordination Document under 30 CFR 550.194. As part of the environmental reviews conducted for post-lease activities within the GOM, available historical, geological, and survey information on each proposed action within the APE will be evaluated by BOEM's staff of marine archaeologists regarding the potential presence of archaeological resources to determine if additional archaeological resource surveys and mitigation are warranted. If potential historic properties (archaeological resources) are discovered and may be affected by the proposed undertaking, BOEM will develop and evaluate alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties. BOEM usually requires lessees to modify their undertakings to avoid all impacts to the potential historic property. If avoidance is not practical, BOEM will consult with the State Historic Preservation Office to resolve adverse effects to the historic property and to determine the appropriate resolution of these adverse effects. Additionally, BOEM requires lessees to adhere to a chance finds/unanticipated discovery clause that requires a lessee to stop seafloor disturbing activities in the vicinity of the discovered potential resource and to report of any cultural material found during activities carried out on the lease.

Based on BOEM's reasonable and good faith identification efforts, and BOEM's proposed avoidance of adverse effects to any potential historic properties discovered during industry-required surveys, BOEM has determined that the proposed 2017-2022 GOM lease sales will have no effect upon historic properties. BOEM requests your concurrence with this finding. If you have any questions, please feel free to contact Mr. Douglas Jones at (504) 736-2859 or by email at douglas.jones@boem.gov.

Sincerely,

Terri L. Thomas

for Joseph A. Christopher
Regional Supervisor
Office of Environment

Enclosure

STATE OF ALABAMA
ALABAMA HISTORICAL COMMISSION
468 SOUTH PERRY STREET
MONTGOMERY, ALABAMA 36130-0900

May 10, 2016

LISA D. JONES
ACTING EXECUTIVE DIRECTOR
STATE HISTORIC PRESERVATION OFFICER

TEL: 334-242-3184
FAX: 334-240-3477

Mr. Gary D. Goeke
Chief, Environmental Assessment Section
Office of Environment (GM 623E)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Re: AHC 2016-0729
Draft 2017-2022 GOM Multisale EIS
Gulf of Mexico

Dear Mr. Goeke:

Upon review of the above referenced document, we request that a professional maritime archaeologist survey the project area(s) to identify any cultural resources that may be present. Please submit the resulting report to our office for review and determination prior to construction activities. Please note that the report should conform to Alabama state guidelines for maritime survey (enclosed).

We appreciate your commitment to helping us preserve Alabama's historic archaeological and architectural resources. Should you have any questions, please contact Amanda McBride at 334.230.2692 or Amanda.McBride@preserveala.org. Have the AHC tracking number referenced above available and include it with any future correspondence.

Sincerely,

Lee Anne Wofford

Lee Anne Wofford
Deputy State Historic Preservation Officer

LAW/AMH/amh

APPENDIX L

RESPONSES TO PUBLIC COMMENTS ON THE DRAFT MULTISALE EIS

L RESPONSES TO PUBLIC COMMENTS ON THE DRAFT MULTISALE EIS

All comments (i.e., letters, public meeting transcripts, emails, etc.) were analyzed to identify all substantive issues raised by the public. Each substantive issue within an individual's comment was assigned a unique identifier. For example, the first substantive comment from the American Petroleum Institute was assigned API-1. Comments were then grouped by similar issues into 10 major categories, and responses are provided for each issue. The comments were reproduced verbatim as they were received. When similar issues were raised by several commenters, a single response has been provided for multiple comments. The comments and responses are presented in a matrix (**Table L-1**) and are organized by the following 10 topics: Topic 1–NEPA Process and Public Involvement; Topic 2–NEPA Analysis; Topic 3–Alternatives; Topic 4–Environmental Issues and Concerns; Topic 5–Cumulative Analysis; Topic 6–Oil Spills; Topic 7–Mitigation; Topic 8–Regulations and Safety; Topic 9–Statutory Compliance; and Topic 10–Other. Some topics include subtopics to further group similar comments. Topic 3 includes a subtopic on stated preference for those commenters who stated a preference for a particular alternative. Topic 4 has 15 subtopics (i.e., Climate Change, Greenhouse Gases, Well Stimulation, Renewable Energy and Alternative Uses of the OCS, Natural Stressors, Air Quality, Coastal Habitats, Biologically Sensitive Areas, Fish and Invertebrates, Birds and Protected Birds, Marine Mammals, Sea Turtles, Infrastructure, Socioeconomics, and Environmental Justice) to separate the various environmental issues and concerns raised by commenters.

An index of comments, which is organized by topic and commenter, can be found below. An individual or group can search by name to more quickly find BOEM's response. All comment letters, emails, and public meeting transcripts, along with their respective unique identifiers, are reproduced in their entirety following the matrix and references.

Topic 1 – NEPA Process and Public Involvement

- American Petroleum Institute: API-2, API-6
- Johanna de Graffenreid, Gulf Restoration Network: GRN-4
- Thao Vu, Mississippi Coalition for Vietnamese-American Fisher Folk and Families: MCVAFFF-1, MCVAFFF-2, MCVAFFF-3, MCVAFFF-4, MCVAFFF-6, MCVAFFF-9
- Sierra Club: SC-11
- Jennifer Crosslin, Steps Coalition: STEPS-1
- Susan Feathers: SF-4

Topic 2 – NEPA Analysis

- United States Environmental Protection Agency: USEPA-1, USEPA-13, USEPA-16
- American Petroleum Institute: API-8, API-11, API-12, API-13, API-14, API-15
- Apalachicola Riverkeeper: AR-3
- Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC): CBD, BL, GRN, LBB, RAHC-4; CBD, BL, GRN, LBB, RAHC-5; CBD, BL, GRN, LBB, RAHC-7; CBD, BL, GRN, LBB, RAHC-10
- Gulf Restoration Network: GRN-2
- Howard Page, Gulf Restoration Network: GRN-5
- Lone Star Chapter of the Sierra Club: LSCSC-2, LSCSC-8, LSCSC-9, LSCSC-10, LSCSC-17
- Sharon Hayes, Restore Mississippi Sound: RMS-5, RMS-6
- Sierra Club: SC-1, SC-2, SC-7, SC-10
- ConocoPhillips: CP-1, CP-2, CP-4
- Susan Feathers: SF-2
- Yolanda Ferguson: YF-1
- Renate Heurich: RH-8
- Hilton Kelley: HK-5
- Cyrus Reed: CR-1
- Robert Desmarais Sullivan: RDS-2
- Community Advocate: CA-2 (BOEM received two additional comment letters from this respondent covering the same topic.)
- Ronald Kardos: RK-1
- Rachel Walsh: RW-2

Topic 3 – Alternatives

- American Petroleum Institute: API-10
- Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC): CBD, BL, GRN, LBB, RAHC-11; CBD, BL, GRN, LBB, RAHC-12

- Sierra Club: SC-3, SC-4
- Lone Star Chapter of the Sierra Club: LSCSC-3
- Johanna de Graffenreid, Gulf Restoration Network: GRN-1
- Cyrus Reed: CR-10

Stated Preference

- Carol Adams-Davis, Alabama Chapter of the Sierra Club: ACSC-2
- American Petroleum Institute: API-5
- Apalachicola Riverkeeper: AR-6
- Lone Star Chapter of the Sierra Club: LSCSC-4
- No New Leases Form Letter: NNL-5
- Spectrum Geo: SPECTRUM-1
- Brenda Warger: BW-1
- Kellan Lyman: KL-1
- Rachel Walsh: RW-1
- Andrea Alexander: AA-1
- Community Advocate: CA-3 (BOEM received two additional comment letters from this respondent covering the same topic.)
- David Hilfiker: DH-1
- Diana Tomlinson: DT-1
- Erica Heimberg: HM-1
- J Conn: CONN-1
- James Mulcare: JM-1
- Jane McBride: JMB-1
- Jason Hannon: JH-1
- Jeff Cobb: JC-1
- Joanna Nasar: JN-1
- John Kersting: JK-1
- Leah Gentry: LG-1
- Margie Vicknair-Pray: MVP-1

- Melissa Fleming: MF-1
- Michelle Macy: MM-1
- Rebecca Parsons: RP-3
- Ronald Kardos: RK-3
- Sally Stevens: SS-1
- Suzanne Cohen: COHEN-1

Topic 4 – Environmental Issues and Concerns

Climate Change

- Leon Soil and Water Conservation District Supervisory Board: LSWCDSB-1
- Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC): CBD, BL, GRN, LBB, RAHC-6
- Alabama Chapter of the Sierra Club: ACSC-1
- Lone Star Chapter of the Sierra Club: LSCSC-13, LSCSC-15
- Sierra Club: SC-9
- Katrina Dubytz: KD-3
- Renate Heurich: RH-6
- Harriett Myers: HM-2
- Cyrus Reed: CR-2, CR-6
- Kim Ross: KR-3
- Brenda Warger: BW-3
- Jane McBride: JMB-2
- John Kersting: JK-3
- Kim Schultz: KS-1
- Rebecca Parsons: RP-1

Greenhouse Gases

- Lone Star Chapter of the Sierra Club: LSCSC-5, LSCSC-12
- No New Leases Form Letter: NNL-3
- Sierra Club: SC-8

- Jennifer Crosslin, Steps Coalition: STEPS-3
- Katrina Dubytz: KD-2
- Cyrus Reed: CR-5

Well Stimulation

- United States Environmental Protection Agency: USEPA-3
- Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC): CBD, BL, GRN, LBB, RAHC-9
- John Young: JY-1

Renewable Energy and Alternative Uses of the OCS

- Howard Page, Gulf Restoration Network: GRN-12
- Lone Star Chapter of the Sierra Club: LSCSC-7
- Sharon Hayes, Restore Mississippi Sound: RMS-7
- Hilton Kelley: HK-6
- Jennifer Crosslin, Steps Coalition: STEPS-4
- Brenna Landis: BL-2
- Bruce Melton: BM-1
- Rebecca Parsons: RP-2

Natural Stressors

- Apalachicola Riverkeeper: AR-2
- Sharon Hayes, Restore Mississippi Sound: RMS-3
- Brenna Landis: BL-1

Air Quality

- United States Environmental Protection Agency: USEPA-9, USEPA-10
- American Petroleum Institute: API-16, API-17, API-18, API-19, API-20, API-21, API-22, API-23
- Lone Star Chapter of the Sierra Club: LSCSC-16
- Renate Heurich: RH-4

- Cyrus Reed: CR-7
- Kim Ross: KR-1, KR-2, KR-4

Coastal Habitats

- United States Environmental Protection Agency: USEPA-5, USEPA-8
- Louisiana Department of Natural Resources: LADNR-2
- Steve Shepard, Gulf Coast Group of the Mississippi Sierra Club: GCGMSC-2
- Charles Mackey Clark: CMC-1
- Hilton Kelley: HK-2, HK-4

Biologically Sensitive Areas

- Apalachicola Riverkeeper: AR-4
- Cyrus Reed: CR-4

Fish and Invertebrates

- American Petroleum Institute: API-24, API-25, API-26, API-27, API-28

Birds and Protected Birds

- American Petroleum Institute: API-29, API-30
- Lone Star Chapter of the Sierra Club: LSCSC-11

Marine Mammals

- American Petroleum Institute: API-31, API-32, API-33, API-34, API-35, API-36, API-37, API-38, API-39, API-40, API-41, API-42, API-43, API-44, API-45, API-46

Sea Turtles

- American Petroleum Institute: API-47, API-48, API-49, API-50, API-51, API-52, API-53

Infrastructure

- United States Environmental Protection Agency: USEPA-6, USEPA-12, USEPA-14

Socioeconomics

- Louisiana Department of Natural Resources: LADNR-1
- Consumer Energy Alliance: CEA-1, CEA-2
- Steve Russell, OffshoreAlabama.com: OAL-1
- Cyrus Reed: CR-3
- Rachel Walsh: RW-3

Environmental Justice

- Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC): CBD, BL, GRN, LBB, RAHC-13
- Sierra Club: SC-12
- Lone Star Chapter of the Sierra Club: LSCSC-6
- No New Leases Form Letter: NNL-2
- Katrina Dubytz: KD-1
- Howard Page, Gulf Restoration Network: GRN-11
- Renate Heurich: RH-5, RH-7
- Jennifer Crosslin, Steps Coalition: STEPS-2
- Thao Vu, Mississippi Coalition for Vietnamese-American Fisher Folk and Families: MCVAFFF-5

Topic 5 – Cumulative Analysis

- American Petroleum Institute: API-9
- Thao Vu, Mississippi Coalition for Vietnamese-American Fisher Folk and Families: MCVAFFF-7
- David Underhill: DU-1
- Brenda Warger: BW-2
- Community Advocate: CA-1 (BOEM received two additional comment letters from this respondent covering the same topic.)

Topic 6 – Oil Spills

- Brian Lee, Leon Soil and Water Conservation District Supervisory Board in Leon County, Florida: LSWCDSB-2
- Apalachicola Riverkeeper: AR-1
- Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC): CBD, BL, GRN, LBB, RAHC-8
- Steve Shepard, Gulf Coast Group of the Mississippi Sierra Club: GCGMSC-1
- Johanna de Graffenreid, Gulf Restoration Network: GRN-3
- Howard Page, Gulf Restoration Network: GRN-9, GRN-10
- Lone Star Chapter of the Sierra Club: LSCSC-18
- Thao Vu, Mississippi Coalition for Vietnamese-American Fisher Folk and Families: MCVAFFF-8
- No New Leases Form Letter: NNL-4
- Sharon Hayes, Restore Mississippi Sound: RMS-1, RMS-2, RMS-4
- Sierra Club: SC-5, SC-6
- Yolanda Ferguson: YF-6, YF-7
- Renate Heurich: RH-2
- Hilton Kelley: HK-5
- Harriett Myers: HM-3, HM-4
- Cyrus Reed: CR-9
- Sky Yardley: SY-1
- John Kersting: JK-2
- Ronald Kardos: RK-2
- John Young: JY-5

Topic 7 – Mitigation

- United States Environmental Protection Agency: USEPA-4, USEPA-7, USEPA-11
- Alabama Department of Environmental Management (ADEM): ADEM-1

- Alabama Historical Commission: AHC-1
- State of Louisiana Department of Natural Resources (LADNR): LADNR-3

Topic 8 – Regulations and Safety

- United States Environmental Protection Agency: USEPA-2
- American Petroleum Institute: API-3
- Apalachicola Riverkeeper: AR-5
- Howard Page, Gulf Restoration Network: GRN-6, GRN-7, GRN-8
- ConocoPhillips: CP-3
- Yolanda Ferguson: YF-3, YF-4, YF-5
- Renate Heurich: RH-3
- Harriett Myers: HM-1
- Jack Radosta: JR-1
- Maxine Ramsay: MR-1
- Cyrus Reed: CR-8
- John Young: JY-4

Topic 9 – Statutory Compliance

- United States Environmental Protection Agency: USEPA-15
- American Petroleum Institute: API-7
- Care2Petition: Care2Petition-1
- Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC): CBD, BL, GRN, LBB, RAHC-2; CBD, BL, GRN, LBB, RAHC-3; CBD, BL, GRN, LBB, RAHC-14
- Lone Star Chapter of the Sierra Club: LSCSC-14

Topic 10 – Other

- American Petroleum Institute: API-1, API-4
- Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC): CBD, BL, GRN, LBB, RAHC-1

- Consumer Energy Alliance: CEA-3, CEA-4
- Caitlin Switzer, The Ehrhardt Group: EG-1
- Melissa Cloutet, Louisiana Mid-Continent Oil and Gas Association (LAMOGA): LAMOGA-1, LAMOGA-2
- Lone Star Chapter of the Sierra Club: LSCSC-1
- No New Leases Form Letter: NNL-1
- Susan Feathers: SF-1, SF-3
- Yolanda Ferguson: YF-2
- Renate Heurich: RH-1
- Hilton Kelley: HK-1, HK-3
- Robert Desmarais Sullivan: RDS-1
- John Young: JY-2, JY-3

Table L-1. Public Comments and BOEM's Response Matrix.

Commenter	Comment ID	Comment	Response
Topic 1 – NEPA Process and Public Involvement			
American Petroleum Institute (API), Andy Radford	API-2	To the extent that BOEM plans to use the new geospatial platform *(GeoPortal)* as part of this EIS scoping process, API understands the quest to make the process more efficient by allowing information submitted to be depicted in a mapping format, but we are concerned about the quality and consistency of data being submitted as comments through this system. We recognize that any form of public comment may include anecdotal data that may be outdated and may or may not be standardized, peer reviewed, or subjected to quality assurance procedures. We request that BOEM consider instituting a quality assurance, quality control system whereby data received through the new *GeoPortal* are reviewed for validity and scientific integrity prior to consideration during the PEIS process. BOEM should take any other necessary steps to make sure data are not biased or improperly interpreted. The EIS must use data from the best available peer-reviewed scientific literature, and not speculation, when assessing potential impacts of oil and natural gas activities on the environment.	Thank you for your comment. BOEM used the *GeoPorta*l technology during the public comment period on the Five-Year Program EIS. This technology was not used in the public comment process for this Multisale EIS. However, any information received through the *GeoPortal* software was properly vetted prior to its use in developing the Five-Year Program EIS. BOEM is committed to using the best available scientific information in all of its EISs, consistent with the information requirements under NEPA.
American Petroleum Institute (API), Andy Radford	API-6	API believes that the detailed analysis provided in the DEIS, along with the other supporting environmental documents and additional assessments being conducted by BOEM provide a thorough analysis upon which to make decisions related to the first proposed lease sale (Regionwide Lease Sale 249), new or revised exploration and development plans in the CPA, and future permit applications, without delay. API supports the analysis made by BOEM in the Multisale DEIS, but there are issues that BOEM needs to address before finalizing the DEIS. API notes that the DEIS contains (by reference) updated.	BOEM appreciates your comment. The technical information prepared in support of this Multisale EIS has previously appeared in the Gulf of Mexico OCS Region's NEPA documents and was made available for public review and comments at those times. After review of these documents and the comments received from the public on these chapters, BOEM determined that no substantial comments have been received. Furthermore, BOEM determined that no substantial changes were needed prior to updating and publishing these technical papers. Therefore, this information has been incorporated by reference into this Multisale EIS. Updates to the technical papers will occur as needed. Because

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		information and analyses regarding the 2010 Macondo oil spill This new information supports the NEPA process by describing the current environmental baseline conditions in the GOM including the results of new scientific studies regarding the spill. We encourage BOEM to continue reviewing and evaluating the good, peer-reviewed science in this and other areas and to avoid the use of unsubstantiated or anecdotal information. API supports BOEM's effort to develop technical reports supporting technical information in previous NEPA reviews and reduce the overall page length and encyclopedic nature of NEPA reviews. Due to the report lengths, publication dates of the reports (2016), and time allotted to the review the DEIS, we recommend that BOEM provide an opportunity to review and comment on technical reports to support an adaptive approach "conducive to reducing the size of this Multisale EIS and future NEPA documents". While BOEM believes there have been minimal updates to information in the technical reports, that should not be the reason for not providing an opportunity for stakeholder input, especially with reports that could be influenced by the substantial data and information being provided post-Macondo by stakeholders, including the oil and gas industry. API hopes that future NEPA documents represent a truly streamlined analysis of only new information, but only supports if such information is added through appropriate consultation from all appropriate stakeholders, including the oil and gas industry, in the Gulf of Mexico region.	BOEM values the input of its stakeholders, BOEM would welcome and consider substantial comments on supporting technical information that is incorporated by reference in an EIS.
Sierra Club, Devorah Ancel,	SC-11	BOEM does not make Oil Spill Response Plans and the certification process open to public notice and comment. However, NEPA requires more: "The	Oil-spill response plans are discussed in **Chapter 3.2.8.1.1** and **Appendix A.5** of this Multisale EIS, and the discussion of mitigating measures can be

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Staff Attorney		NEPA process has two purposes. First, '[i]t ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts.' Second, it 'guarantees that the relevant information will be made available to the larger audience that may also play a role in both the decision-making process and the implementation of that decision." "The 'informational role' of an EIS is to 'giv[e] the public the assurance that the agency 'has indeed considered environmental concerns in its decision-making process,' and, perhaps more significantly, provides a springboard for public comment' in the agency decision-making process itself." In *Quechan,* the court found the NEPA process adequately fulfilled in the analysis of a land transfer for a refinery where the public would be given the opportunity to comment on later stages of construction of the refinery. However, BOEM provides no avenue to fulfill the second purpose of NEPA-public participation-in regards to oil spill response plans ("OSRPs"). OSRPs provide the "mitigation" which BOEM uses to claim that the environmental risk of a blowout resulting in a large oil spill has been reduced to an insignificant level. The public cannot meaningfully participate in an environmental review of a lease sale where the basis for the minimization of risk associated with the activities that are reasonably foreseeable pursuant to that sale have not been exposed to public scrutiny and comment.	found in **Appendix B**. While outside of the scope of this Multisale EIS, BOEM notes that oil-spill response plans fall under BSEE's jurisdiction. While other later OCSLA stages are supported by NEPA reviews of various types, oil-spill response plans are not subject to reviews under NEPA and the ESA. This was recently upheld in an Appeals Decision by the 9th Circuit Court (Nguyen and Nelson, 2015). The 9th Circuit Court's panel rejected the plaintiffs' contention that BOEM violated NEPA by failing to prepare an EIS before approving the plans. The panel held that BOEM reasonably concluded that it must approve any plan that met the statutory requirements of the Clean Water Act. The panel concluded that BOEM's approval of Shell's plans was not subject to the requirements of NEPA (Nguyen and Nelson, 2015). While BOEM discusses reasonably foreseeable oil spills and oil-spill response activities in **Chapter 3.2.1**, a catastrophic oil spill as a result of a blowout is not part of a proposed action nor is it considered likely to occur. BOEM, nevertheless, provides an analysis of such a spill in the *Catastrophic Spill Event Analysis* technical report (USDOI, BOEM, 2017).
Steps Coalition, Jennifer Crosslin, Community Organizer	STEPS-1	Thirty days to review over 700 pages of technical scientific information is not enough time to provide meaningful comments. Thus, I am requesting that the public comment period be extended at least 60 days.	On April 22, 2016, BOEM published a Notice of Availability on the Draft Multisale EIS. NEPA requires a 45-day comment period on Draft EISs, a period that may be extended at the discretion of the agency issuing the document. In the case of the Draft Multisale EIS, BOEM determined that 45 days was adequate and appropriate for a programmatic

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			document. However, all stakeholders were encouraged to provide comments on the EIS during the comment period, which ended on June 7, 2016. BOEM recognizes the importance of input from public stakeholders and appreciates the timing constraints noted by the commenter.
Gulf Restoration Network, Johanna de Graffenreid	GRN- 4	Additionally, hosting public comment opportunities after work hours and in a location accessible by public transit is appreciated and allows for full community participation.	Thank you for your comment. BOEM did its best to consider work hours and locations that were easily accessible for the public. BOEM will continue to consider these factors when planning future public participation opportunities.
Susan Feathers	SF-4	Thanks for a great discussion, information, and a good diligence to inform the public. Well done.	Thank you for your comment. BOEM is continually looking for ways to improve public involvement. BOEM's open-house meeting format is designed to create a better atmosphere for open and honest dialogue to not only provide information to the public but to also help with the solicitation of meaningful comments to improve the NEPA review.
Mississippi Coalition for Vietnamese-American Fisher Folk and Families, Thao Vu, Director	MCVAFFF-1	We reiterate the great importance to extend the public comment deadline to 60 additional days. It is an extremely lengthy, technical document that needs translation & dissemination to the Vietnamese-American fishing communities in the Gulf Region.	Thank you for your comment. BOEM had several follow-up discussions with Ms. Vu to identify specific areas of interest and sections of this Multisale EIS that would be most beneficial to the community. As a result, BOEM provided translations of all the meeting handouts, visual aids, and Executive Summary, as well as the chapters on fish and invertebrate resources and commercial fishing. Staff also went on a dock tour with Ms. Vu and her constituents along the Gulf Coast of Mississippi to view, firsthand, the docks and facilities used by fisherfolks, to talk with constituents, and to provide additional information on BOEM's environmental review process. Because of the special language needs, BOEM agreed to accept comments from the Coalition and its members through August 31, 2016.
	MCVAFFF-3	And another challenge is that many have language access, right, needs. They arrive here as adults in the Gulf and they didn't have an opportunity to obtain a higher education, so they have limited English proficiency. They have challenges in terms of accessing computers and they are unaware of the Federal Register, right. And we don't think that any of their documents have been translated.	
	MCVAFFF-6	We also want to -- we're very concerned about environmental injustices, because there's a principle -- you know, a principle is called environmental justice principles. And part of that means being able to meaningfully engage and participate, you know, and we believe that particularly for minority,	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		underserved populations, where language access or computer access challenges, they haven't been meaningfully engaged and they still have -- they suffering from huge economic, social, and health impacts that hasn't been remediated, reduced.	
Mississippi Coalition for Vietnamese-American Fisher Folk and Families, Thao Vu, Director	MCVAFFF-2	First of all, you know, I work with -- closely with a lot of the Vietnamese American fishing communities here in of Mississippi. And one of our key concerns is an accurate public notice, right, and that we think that right now, first of all, it's shrimping season in Louisiana and a number of the Fisher Folks are either shrimping in Louisiana or they're getting ready to go to Louisiana, right. And they weren't aware of this very important hearing.	BOEM works diligently to inform the public of upcoming meetings. An announcement of the dates, times, and locations of the public meetings was included in the Notice of Availability of the Draft Multisale EIS. A copy of the public meeting notices was included with the Draft Multisale EIS that was mailed to the parties listed in **Chapter 5.6.2.5**, was published in local newspapers, and was posted on BOEM's website at http://www.boem.gov/nepaprocess/. Furthermore, in response to Ms. Vu's comments, BOEM met with Ms. Vu and several of her constituents to listen to their concerns, provided Vietnamese translations of specific sections of concern of the Draft Multisale EIS, and provided additional time for the MCVAFFF to provide more comments.
Mississippi Coalition for Vietnamese-American Fisher Folk and Families, Thao Vu, Director	MCVAFFF-4	It's a very lengthy, technical documents, and because of all those challenges, you know, we are asking for this comment period to be extended 60 days. Adequate time to -- for outreach and disseminating this information and giving enough people -- giving people enough time to comment on it, right? So that's critically important, you know.	After the translated documents were provided to Ms. Thao Vu, Director, Mississippi Coalition for Vietnamese American Fisher Folks and Families, BOEM met with Ms. Vu on July 15, 2017, to conduct a tour of the facilities used by her constituents. Because of the special language needs, BOEM agreed to accept any comment from Ms. Vu and the community through August 31, 2016. BOEM did not receive any additional comments.
Mississippi Coalition for Vietnamese-American Fisher Folk and Families, Thao Vu,	MCVAFFF-9	So in terms of this BOEM public hearing the way it's structured, we don't think that it's a good process. A good process is actually just -- you could have a presenter and you could also have it rolling at the same time, and you could actually have materials and handouts for the public. Right. All of that. But you need to set aside time for folks to be able to comment, an accurate time. Not just three minutes,	BOEM has determined (through internal processes and informal public comment) that the new open-house meeting format provides more productive meetings. To ensure that all meeting attendees had the opportunity to provide verbal/oral comments, an initial time limit was set for 3 minutes. Afterward, if time allowed (i.e., no other individuals were waiting to make comments), anyone was allowed to provide

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Director		but at least six minutes. Right. Because some of us may have to interpret for others who have language access problems, challenges. Right. In addition, you know, the purpose of a public hearing is there for us to express our comments or our recommendations, our concerns, and everyone have equal access, opportunity to hear, right. And be informed about it. And by setting -- by creating this structure and asking us to submit our comments to a court reporter, you know, without anyone else being able to hear our comments, concerns and recommendations, we don't think – we think that's not a fair or inclusive process. In fact, it's very exclusionary.	additional oral comments. Additionally, there were multiple ways to provide comments on the Draft Multisale EIS. These included providing written comments at the public meetings, mailing comments, emailing comments, and using the regulations.gov portal.
		Topic 2 – NEPA Analysis	
American Petroleum Institute (API), Andy Radford	API-8	BOEM indicates the DEIS will be used to decide whether, and under what circumstances, lease sale 249 will be held in 2017. DEIS at p. iii. However, the DEIS is also intended to consider the environmental impacts associated with nine additional lease sales from 2018-2022. Though additional NEPA review will occur for later decisions to hold any of those individual lease sales, that analysis likely will tier heavily from the current DEIS *(see p.* 2-4). Although it is clear in the introductory material and the discussion of the alternatives in Chapter 2 that the DEIS is intended to cover up to 10 lease sales, it becomes less clear as BOEM moves on to discuss the direct, indirect, and cumulative impacts of "a proposed action." BOEM should first clarify that "a proposed action" means "any of the 10 lease sales proposed for the GOM in 2017 to 2022." More importantly, BOEM should ensure that its impact analysis considers not only the environmental impacts of each lease sale, but also the cumulative impacts of *all* contemplated lease sales. Doing so is not only an important aspect of the cumulative impact analysis for Lease Sale 249, but also will likely reduce the NEPA burden for each of the nine	Thank you for your comment. The text in the **Abstract, Executive Summary, and Chapters 1, 3, and 4** has been revised to clearly show the application of this Multisale EIS for all 10 proposed lease sales, as well as clearly showing that the analysis is for a single proposed lease sale to support a decision for a single proposed lease sale, regardless of the lease sale number. After completion of this Multisale EIS, BOEM will make a decision on proposed Lease Sale 249. BOEM recognizes that the decision for each of the nine subsequent proposed lease sales will rely heavily on this Multisale EIS and that the appropriate level of supplemental review will be conducted to account for new information since this Multisale EIS was prepared. The impacts of holding 10 GOM lease sales in the Five-Year Program were analyzed in the 2017-2022 Five-Year Program EIS (USDOI, BOEM, 2016a).

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		subsequent lease sales.	
American Petroleum Institute (API), Andy Radford	API-11	BOEM should ensure that it applies the appropriate regulatory standard to its consideration of incomplete and unavailable information. The Council on Environmental Quality regulation at 40 C.F.R. § 1502.22 requires agencies to consider incomplete or unavailable information. When preparing an EIS, an agency must either obtain information that is "essential to a reasoned choice among the alternatives" or explain why such information is too costly or difficult to obtain. *Id., Native Village of Point Hope,* 740 F.3d at 496. BOEM deals admirably with the reality of incomplete or unavailable information throughout the DEIS, but in a few places it misstates the appropriate regulatory standard. For example, with respect to deepwater benthic communities, BOEM acknowledges that knowledge concerning deepwater benthic community composition, life cycles, and location is currently incomplete. See DEIS at p. 4-118. BOEM also acknowledges that "[d]etailed information on impact-producing factors [such as exposure to oil spill events] may be relevant to the evaluation of impacts on deepwater benthic communities." *Id.,* at 4-118 -4-119. However, BOEM concludes that, *because* the agency used the "best available science to determine the range of reasonably foreseeable impacts," and "appl[ied] accepted scientific methodologies to...integrate existing information and extrapolate potential outcomes," *"[t]herefore,* BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives." *Id.* at 4-119. In numerous sections of the DEIS dealing with incomplete or unavailable information, BOEM reaches similar conclusions or no conclusion at all with respect to the "essential" nature of the incomplete and unavailable information. *E.g.,* DEIS	Thank you for your comment. BOEM has reviewed each subchapter in **Chapter 4** where information was incomplete or unavailable, and BOEM has confirmed that it complied with its obligations under NEPA to determine if the information was relevant to reasonably foreseeable significant adverse impacts and, if so, whether it was essential to a reasoned choice among alternatives and, if it was essential, whether it can be obtained and whether the cost of obtaining the information is exorbitant, as well as whether scientifically credible information using generally accepted scientific methodologies can be applied in its place (40 CFR § 1502.22).

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		at pp. 4-7 - 4-8 (discussing impacts associated with the *Deepwater Horizon* spill); 4-353 (assessing visual impacts, and making no finding with respect to whether the missing information is essential to a reasoned choice among the leasing alternatives). BOEM's use of the best available science does not make essential information nonessential. To meet its requirements under 40 C.F.R. § 1502.22, BOEM must first determine whether the missing information is essential to a reasoned choice among the alternatives. If BOEM determines that the missing information is essential, then the agency must determine whether the costs of obtaining the information are exorbitant or the means of obtaining it are not known. *Oceana v. BOEM,* 37 F. Supp. 3d 147 (D.D.C. 2014); *Native Village of Point Hope,* 740 F.3d at 495-497. If either is true, then BOEM must do precisely what it has done: explain that the information is incomplete or unavailable, explain the relevance of the incomplete or unavailable information, provide a summary of the existing science, and provide an analysis based on theoretical approaches or generally accepted research methods. 40 C.F.R. § 1502.22(b). Although BOEM has supplied all the information and analysis it can where it perceives missing information, in some instances it has not determined whether the missing information is essential to a reasoned choice among the alternatives. Moreover, in some instances BOEM has not determined whether obtaining additional essential information is feasible. BOEM should clearly make the required determinations to ensure adherence with 40 C.F.R. § 1502.22.	
Community Advocate	CA-2	BOEM staff admitted to gaps in the analytical process, which does not meet the minimum "Best	BOEM has determined that the analysis in this Multisale EIS is centered on the best available and

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		science/Best Practice for NEPA compliance.	credible scientific information. BOEM's subject-matter experts are experts in their fields, and they conducted extensive scientific and literature reviews to ensure their analyses and impact conclusions are fully supported by the best available and credible scientific information. BOEM's subject-matter experts have clarified in this Multisale EIS where incomplete or unavailable information may be essential to a reasoned choice among alternatives, if the information could be obtained or, if the costs of obtaining it are exorbitant, and that what scientifically credible information is available was applied using accepted scientific methodologies.
American Petroleum Institute (API), Andy Radford	API-12	In the Draft Programmatic Environmental Impact Statement (DPEIS) on the Outer Continental Shelf (OCS) Oil and Gas Leasing Program: 2017 -2022 BOEM introduced the concept of Environmentally Important Areas and uses the acronym "EIA" when discussing them. Our review of the DEIS does not show any discussion of "Environmentally Important Areas." The DPEIS emphasized the importance of Environmentally Important Areas (EIAs) to the extent that they are the focus of the Alternative B (Reduced Proposed Program) approach, and BOEM has even provided a Fact Sheet to help explain these. Additionally, in discussing "Topographic Stipulation Blocks" in the Draft PEIS, these are considered among the "EIAs that could be geographically defined, were supported by adequate data, but would not affect the size or location of potential leasing." However, this DEIS does not consider EIAs specifically by name, but rather defines the acronym "EIA" as an Economic Impact Area (DEIS 3-79). In contrast, in this DEIS, Topographic Stipulation Blocks are considered in Alternative D because they "can be geographically defined, and adequate information exists regarding their ecological importance and sensitivity to OCS oil- and gas-related activities."	In this Multisale EIS, the term EIA (i.e., economic impact area) represents regions of important environmental value where there is potential for conflict between ecologically important or sensitive habitats; maintenance of social, cultural, and economic resources; and possible oil and gas development. Only one "environmentally important area" within the Gulf of Mexico was identified at the program level, i.e., the topographic features. The Five-Year Program EIS did not analyze this environmentally important area as an alternative because, even though the topographic features can be geographically defined, this area would not generally affect the size or location of potential leasing at the programmatic level. Instead, the Five-Year Program EIS considered the blocks subject to the Topographic Features and Live Bottom (Pinnacle Trend) Stipulations as programmatic mitigation that is intended to streamline subsequent environmental reviews and decisions at the lease sale stage. It is more appropriate to analyze these areas on a finer scale at the region level (i.e., this Multisale

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		The two definitions are very similar, which makes the EIA concept even more confusing and hard to justify its exclusion from the multi-lease EIS. Furthermore, the inclusion of Alternative D, which could exclude blocks subject to the Topographic Features Stipulation, is in direct contrast to the Draft PEIS, which identified them as not affecting the size or location of potential leasing. BOEM is mixing the use these terms or dropping some terms altogether that were regularly used in the past (such Areas of Special Concern [AOCs]), which is confusing and should be clarified between the two documents. AOCs, in particular, had been part of BOEM's NEPA vocabulary going back to 2002, which included federally managed areas (e.g., Marine Protected Areas, National Marine Sanctuaries, National Parks, and National Wildlife Refuges). AOCs in previous BOEM NEPA documents included locations that have been given special designations by Federal, State, and nongovernmental organizations (e.g., National Estuarine Research Reserves, National Estuary Program Sites, and Military and National Aeronautics and Space Administration [NASA] Use Areas) (see BOEM 2012 -2017 OCS Oil and Gas Leasing Program DPEIS 3.9). Essential fish habitat as designated by the United States Department of Commerce (USDOC), National Marine Fisheries Service (NMFS) was also included as an AOC in assessing impact levels for biological and physical resources (BOEM 2012 -2017 DPEIS p.4-9), but discussed in BOEM technical whitepaper and not this DEIS. The dual-use of EIA is confusing and should be clarified across each EIS. If BOEM is changing its	EIS). Subsequently, blocks with sensitive biological features such as topographic features and pinnacle trends were analyzed as a separate alternative to determine if additional protection, i.e., excluding these blocks from future lease sales, is warranted. As far as the use of the term "areas of concern" versus "environmentally important areas" in the Five-Year Program EIS, the use of environmentally important areas is broader than areas of concern and therefore more appropriate in this context. BOEM introduced this term in the Five-Year Program EIS to address the Secretary's requirement for consideration of a landscape-scale approach to planning. For the use of EIA in this Multisale EIS, this term EIA has been used for economic impact areas since the 2007-2012 WPA/CPA Multisale EIS (USDOI, MMS, 2007). No CEQ regulations or guidance exist for the use of acronyms. However, style guides recommend, when you introduce new or unfamiliar acronyms, spelling out the component words first and then placing the acronym in parentheses. As is common with most technical and government documents, BOEM also includes an abbreviations and acronyms list for each NEPA document.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		terminology to replace AOCs with Environmentally Important Areas, additional discussion and explanation of this change is needed to reduce confusion going forward. API recommends that BOEM align the language across the DPEIS and this DEIS to eliminate unnecessary confusion and to provide an explanation of language clarification and the meaning of such terms in regards to impact analysis in each NEPA document. We also recommend that once BOEM aligns the language, that terminology remains consistent in any NEPA document associated with 2017-2022 OCS activities.	
	API-15	Clarify discrepancies in terminology between the 2017 – 2022 GOM Multisale EIS and the 2017 – 2022 Proposed Leasing Program Draft (and Final) Programmatic EIS (herein DPEIS).	
American Petroleum Institute (API), Andy Radford	API-13	This DEIS generally lacks sufficient references for the included information. In many instances, BOEM refers to specific examples, occurrences, or data (See *Comments on specific areas of analysis).* When discussing marine mammals, BOEM references metrics provided from different Federal agencies (i.e. NMFS) and then describes potential impacts to populations without providing reference to quantitative metrics, peer reviewed literature or other sources to support the designation of an impact level or factor. In some cases, it seems that the information may originate from unpublished data, technical memorandums, whitepapers, surveys, etc. Regardless of the source, all information leading to conclusions of impact determinations should be referenced.	BOEM appreciates the substantive content of this comment and has revisited all EIS chapters and specifically **Chapter 4.9.1** (Marine Mammals). All information leading to impact determinations was clarified, and the corresponding literature was cited. Specifically for **Chapter 4.9.1**, BOEM has clarified the consideration of marine mammal stock assessment reports provided by NMFS when making impact determinations. Because NMFS has jurisdiction to manage marine mammal stocks of the Gulf of Mexico under the Marine Mammal Protection Act and Endangered Species Act, BOEM considers much of their information when making impact determinations for the decisionmaker. Revisions to the text can be found throughout **Chapter 4.9** (Protected Species), which also addresses the "Specific Marine Mammal Comments" for **Chapters 4.9.1.1 and 4.9.1.2**.
American Petroleum Institute (API), Andy Radford	API-14	Construct tables for each evaluated impact that it clearly links the impact determinations, specifically for ranges, and (individual and cumulative) data and conclusions with supported evidence and uncertainty	Thank you for your comment. A majority of the subchapters within **Chapter 4** include a table that identifies the potential impacts as a result of the routine activities, accidental events, and cumulative

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		for the resulting determination(s).	impacts of a proposed action. The intent of the table is to provide a summary comparison of the expected impact levels by alternative, which considered impact-producing factors that have the greatest potential impact to each resource. We added a note to each table to refer the reader to the subsequent narrative for further detail on the analysis that clearly links the impact determination to the impact-producing factor and alternative. For example, please refer to **Table 4-1** of the Final Multisale EIS. Furthermore, BOEM added chapter numbers to the subheadings of routine activities, accidental events, and cumulative impacts in order to more clearly cross reference the table to the analysis.
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Attorney	CBD, BL, GRN, LBB, RAHC-4	BOEM's Draft EIS fails to properly define baseline conditions. NEPA requires BOEM to "describe the environment of the areas to be affected or created by the alternatives under consideration." Thus, the establishment of the baseline conditions of the affected environment is a fundamental requirement of the NEPA process. "Without establishing the baseline conditions which exist in the vicinity . . . there is simply no way to determine what effect the proposed [project] will have on the environment and, consequently, no way to comply with NEPA." BOEM lacks critical information regarding the effects of the Deepwater Horizon oil spill on the Gulf of Mexico. The Deepwater Horizon disaster resulted in the deaths of 11 workers and caused a spill of approximately 206 million gallons of oil over the course of at least 87 days. More than 1,000 miles of shoreline were contaminated with oil; 88,522 square miles of ocean- totaling one-third of the Gulf of Mexico-were closed to commercial and recreational fishing; millions of animals were killed or harmed; and local residents were sickened.	Thank you for your comment. BOEM acknowledges that there is some lingering uncertainty regarding the impacts of the *Deepwater Horizon* oil spill. However, this uncertainty has diminished as time passes and as new data and studies have become available. In addition, BOEM has complied with NEPA procedures for dealing with incomplete or unavailable information. BOEM has made some changes to this Multisale EIS in light of this comment in order to clarify the nature of the incomplete or unavailable information related to the impacts of the *Deepwater Horizon* oil spill on the baseline conditions of various resources. Current baselines are described for all resources under their respective "Description of the Affected Environment" chapters. Specific to the Trustees' PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016), the altered baseline includes individual protected species directly affected by this unexpected unique catastrophic event. BOEM understands that each oil-spill event is unique and that its outcome

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Six years later, the Gulf is still reeling from the effects of the spill. Recent studies demonstrate severe lung disease in dolphins; near-record lows of critically endangered Kemp's Ridley sea turtle nesting; oil dispersants toxic to corals and jellyfish; and a "bathtub ring" of oil on the seafloor. Another recent study published in April 2016 indicates that the spill impacted 19% more coastline that originally believed, finding that oil washed up on 1,313 miles of coastline along the Gulf of Mexico. In addition, the 50,000 people involved in cleanup efforts suffer from an increased risk of physical and psychological injury. Gulf residents are still suffering from increased symptoms of depression, anxiety, mental illness, and posttraumatic stress. However, the impacts of the spill are not yet fully understood and are still being studied. For example, the Natural Resource Damage Assessment, which will assess impacts to natural resources that may have been impacted by the spill (including clean-up efforts), is still underway. Moreover, BOEM has repeatedly admitted in other environmental review documents that there are data gaps regarding numerous resources in the Gulf of Mexico, including wetlands, coastal water quality, offshore water quality, air quality, commercial and recreational fishing and environmental justice, and that the impacts of the Deepwater Horizon oil spill on such resources may have changed baseline conditions. Further, while BOEM reinitiated Section 7 consultation under the ESA following the Deepwater Horizon oil spill, BOEM has yet to complete that consultation. Accordingly, BOEM does not have an accurate picture of the effects that authorizing more offshore oil and gas drilling (including in the very	depends on several factors, including time of year and location of the release relative to winds, currents, land, and sensitive resources, as well as specifics of the well and response effort. BOEM also understands that the severity of impacts from an oil spill cannot be predicated on volume alone. BOEM has analyzed a low-probability catastrophic event (USDOI, BOEM, 2017) in conjunction with its analysis of potential effects, as requested by CEQ pursuant to its regulation at 40 CFR § 1502.22. A low-probability catastrophic spill is, by definition, not reasonably certain to occur. Other methods of analysis are significantly limited in their applicability and availability, and they would not provide any meaningful or useful information to be used to assess the risk of a catastrophic spill occurrence at this programmatic level of OCS oil- and gas-related activities in the GOM. The return period of a catastrophic oil spill in OCS areas is estimated to be 165 years, with a 95 percent confidence interval between 41 years and more than 500 years (Ji et al., 2014). BOEM's produced-water data are collected from the Office of Natural Resources Revenue (ONRR). The ONRR's "Oil and Gas Operations Report" (OGOR) collects produced-water data, which can be found on ONRR's website at http://www.onrr.gov/ReportPay/production-reporting.htm). The OGOR-B report includes a disposition code to indicate how the produced water is disposed of (i.e., injected on lease, injected or transferred off lease, or disposed of). BOEM does not manage USEPA's data. It is likely that data collected in different databases will be different. Despite the difference, BOEM considers the potential impacts from the offshore discharge of produced water to be negligible beyond 1,000 m (3,281 ft) from the discharge point to

Table L-1. Public Comments and BOEM’s Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		same area where the Deepwater Horizon spill occurred) could have on already imperiled species. Moreover, BOEM's analysis of baseline conditions regarding water quality is fundamentally flawed. BOEM's Draft EIS states that all offshore oil and gas platforms in the Gulf of Mexico discharged roughly 15.3 billion gallons of produced water in 2014. However, a review of records obtained from the Environmental Protection Agency pursuant to a request under the Freedom of Information Act reveals that offshore oil and gas platforms under the jurisdiction of Region 6-federal waters in the Western Planning Area and the Central Planning Area off the coasts of Texas and Louisiana-discharged *more than 76 billion gallons* of produced waters in 2014. This is a significant discrepancy that must be remedied, particularly considering that produced water contains toxic pollutants released during the drilling process. For example, produced water can contain harmful substances like benzene, arsenic, lead, hexavalent chromium, barium, chloride, sodium, sulfates, and boron, and it also can be radioactive. Produced water itself is potentially harmful to humans, aquatic life, and ecosystems-in fact, a study sponsored by the U.S. Department of Energy demonstrated that oil production yields "environmentally hazardous" produced water. For all of these reasons, BOEM cannot properly define the environmental baseline, and BOEM cannot conduct a proper NEPA analysis unless and until these significant data gaps are filled. Yet BOEM is arbitrarily and capriciously proceeding to allow substantially more offshore oil and gas drilling regardless.	moderate within 1,000 m (3,281 ft). The conclusions reached in this Multisale EIS remain the same, regardless of which estimate is used. In response to the comment on the alleged harmful effects of produced water, additional language describing how USEPA regulates these discharges to prevent unreasonable degradation of the receiving waters has been added to **Chapter 4.2.2.1**. Regarding wetlands, please refer to the updated text in **Chapter 4.3**. The NRDA studies are ongoing, but the Trustees’ PDARP/PEIS has been released and analyzed for relevant information. With the release of the Trustees’ PDARP/PEIS, our understanding of the environmental impacts of the *Deepwater Horizon* explosion, oil spill, and response has greatly increased; however, there are many ongoing long-term and monitoring studies that are not complete. Therefore, our understanding of the lasting effects or long-term recovery of the system is still incomplete and has data gaps, but the information is not essential to a reasoned choice among alternatives. BOEM has revisited the baseline descriptions for the land use/coastal infrastructure and social factors sections and does not agree that enough evidence exists yet to conclusively determine that the *Deepwater Horizon* explosion, oil spill, and response has changed the baseline conditions. However, some additional clarifying language and references been added to supplement the baseline descriptions and the cumulative impacts analysis contained in the Draft Multisale EIS.
Restore Mississippi	RMS-5	No real-life, regional information from the Gulf and coastal areas is used in the decision. For example,	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Sound, Sharon Hayes, Director		baseline conditions in the Gulf are modeled. There is no on-the-ground data used in the EIS. For example, coastal residents believe that the Mississippi Sound is so polluted, they won't go in the water. Tourists who aren't familiar with the water quality will. Earlier this year the entire Mississippi coastal beach was closed for over a month because of Red Tide. Extremely unusual in -- in the cold months. Oysters have practically disappeared from the Mississippi Coast, and shrimp and fish catches are falling. Over 50 dead baby dolphins have washed ashore this year alone. An article published in the last few weeks suggests that the cause of those dead dolphins was the oil spill. Tarballs have been seen regularly on Mississippi beaches, and studies show the deadly vibrio virus feeds on oil and can be found in very high concentrations in proximity to tarballs.	
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-17	BOEM has repeatedly admitted that it lacks critical information regarding the effects of the Deepwater Horizon oil spill on the Gulf of Mexico. It has also repeatedly admitted that there are data gaps regarding numerous resources in the Gulf, including wetlands, coastal water quality, offshore water quality, air quality, commercial and recreational fishing and environmental justice, and that the impacts of the Deepwater Horizon oil spill on such resources may have changed baseline conditions. BOEM therefore cannot properly define the environmental baseline, and cannot conduct a proper NEPA analysis unless and until these significant data gaps are filled.	BOEM acknowledges that there is some lingering uncertainty regarding the impacts of the *Deepwater Horizon* oil spill. However, this uncertainty has diminished as time passes and as new data and studies have become available. In addition, BOEM has complied with NEPA procedures for dealing with incomplete or unavailable information. BOEM has made some changes to this Multisale EIS in light of this comment in order to clarify the nature of the incomplete or unavailable information related to the impacts of the *Deepwater Horizon* oil spill on the baseline conditions of various resources. BOEM has revisited the baseline description and cumulative impacts analysis and has added clarifications and additional information where appropriate (i.e., in the land use and social factors chapters).

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Attorney	CBD, BL, GRN, LBB, RAHC-5	BOEM's Draft EIS fails to consider the greenhouse gas emissions that would be emitted by refining, transporting and burning the oil and gas to be extracted under its proposal. In evaluating the environmental impacts of the proposed action, NEPA requires BOEM to consider and describe the direct and indirect impacts. These impacts are distinct from one another. Direct effects are "caused by the action and occur at the same time and place." Indirect effects are caused by the action but, "are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effect on air and water and other natural systems, including ecosystems. Downstream greenhouse gas emissions are precisely the kind of indirect effects that BOEM must consider in analyzing the impacts of its leasing proposal. Indeed, guidance from the Council on Environmental Quality instructs agencies that "[e]missions from activities that have a reasonably close causal relationship to the federal action, such as those that may occur . . . as a consequence of the agency action (often referred to as downstream emissions) should be accounted for in the NEPA analysis.' As it described, "[f]or example, a particular NEPA analysis for a proposed open pit mine could include the reasonably foreseeable effects of various components of the mining process, such as . . . refining or processing the resource, and using the resource . . . as the direct and indirect effects of phases of a single proposed action." BOEM estimates that its proposal could result in the development and production of up to an estimated	BOEM recognizes the importance of climate change in its NEPA analyses and considers many facets of the potential effects of climate change in its decisionmaking with respect to oil and gas leasing, whether in the Five-Year Program or lease sale analyses. In the Five-Year Program EIS, BOEM compares greenhouse gas emissions from direct OCS emissions to those that could occur from energy substitutes that would presumably replace OCS production in the absence of a new OCS Program and comparable demand levels. Downstream greenhouse gases have been quantified. Please refer to the Five-Year Program EIS for additional information about how BOEM evaluates greenhouse gas emissions and climate change. BOEM expects that reducing OCS oil and gas consumption in the U.S. and the associated emissions from limiting OCS leasing would largely be offset by substitutes from other energy sources, either within the United States or elsewhere. BOEM has considered a no action alternative (i.e., cancellation of a proposed lease sale); however, that does not necessarily equate to zero downstream greenhouse gas emissions from oil and gas unless energy demand or supply changes drastically or cost-competitive clean energy sources are substituted. This Multisale EIS tiers from the Five-Year Program EIS and has included additional information regarding greenhouse gas and downstream emissions information that may result from a Gulf of Mexico oil and gas lease sale in **Chapter 4.1**.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		9.5 billion barrels of oil equivalent. It is possible even more oil will be developed given BOEM 's estimates that put all undiscovered technically recoverable resources in the Gulf of Mexico at 73 billion barrels of oil equivalent. Using EPA's carbon equivalent calculator, this means that BOEM's proposal could result in up to roughly 4.1 to 31.4 billion metric tons of greenhouse gas emissions from consumption of the oil. But BOEM wholly failed to consider the impacts of these emissions or how allowing offshore oil and gas leases in federal waters will impact our ability to limit warming to 1.5 or 2°C consistent with the Paris Agreement. Climate change, driven primarily by the combustion of fossil fuels, poses a severe and immediate threat to the health, welfare, ecosystems, and economy of the United States and the world. In recognition of these threats, the Paris Agreement- adopted by 197 countries, including the United States, on December 12, 2015-codifies the international, scientific consensus that climate change is an *"urgent and potentially irreversible threat to human societies and the planet* and thus requires the widest possible cooperation by all countries." Accordingly, the Paris Agreement commits all signatories to an articulated target to hold the long-term global average temperature "to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to l.5°C above pre-industrial levels." Immediate and aggressive greenhouse gas emissions reductions are necessary to keep warming below a 1.5° or 2°C rise above pre-industrial levels. Put simply, there is only a finite amount of carbon dioxide ("C02") that can be released into the atmosphere without rendering the goal of meeting the 1.5°C (or even a 2°C) target virtually impossible.	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Globally, proven fossil fuel reserves, let alone additional recoverable resources, if extracted and burned, would release enough C02 to exceed this limit several times over. Consequently, the vast majority of fossil fuels must remain in the ground. The physical question of what amount of fossil fuels can be extracted and burned without negating a realistic chance of meeting a 1.5°C or even 2°C target is relatively easy to answer. The Fifth Assessment Report of the International Panel on Climate Change ("IPCC") and other expert assessments have established global carbon budgets, or the total amount of remaining carbon that can be burned while maintaining some probability of staying below a given temperature target. According to the IPCC, total cumulative anthropogenic emissions of C02 must remain below about 1,000 gigatons ("GtC02") from 2011 onward for a 66% probability of limiting warming to 2°C above pre-industrial levels. The Paris Agreement aim of limiting the temperature increase to 1.5°C requires a more stringent carbon budget of only 400 GtC02 from 2011 onward (of which more than 100 GtC02 has already been emitted) for a 66% probability of limiting warming to 1.5°C above pre-industrial levels. Increasing the odds of meeting these targets requires meeting even stricter carbon budgets. Given that global C02 emissions in 2014 alone totaled 36 GtC02, humanity is rapidly consuming the remaining burnable carbon budget needed to have even a 66% chance of meeting the l.5°C temperature limit. Recent analysis shows that the potential emissions from all U.S. federal fossil fuel resources are between 349 and 492 GtC02e, with unleased fossil fuels comprising 91% of these potential emissions. The OCS accounts for 64% of all unleased federal	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		natural gas and 72% of all unleased federal oil, for an estimated total of between 52 and 62 GtC02e. In other words, unleased federal fossil fuels, if extracted and burned, would consume between roughly 70 and 100% of a *global* budget of 450 GtC02e, the amount remaining at the start of 2016 under a budget scenario that itself has only a 66% chance of limiting temperature increase to 1.5°C. Unleased OCS areas alone would consume between 11.6% and 13.8% of that *global* budget. Continued leasing of these fossil fuels is incompatible with any reasonable domestic and international path to limiting warming to l.5°C or even 2°C. Conversely, keeping fossil fuels in the ground by ending new offshore leases will help limit warming by reducing greenhouse gas emissions. For example, a recent report found that for each unit of oil that is not extracted from federal lands, net global consumption of oil and substitute fuels falls by 0.22 units by 2030, with a proportionate decrease in greenhouse gas emissions. Accordingly, the report estimates that ending new offshore and onshore oil leases would lead to a net reduction of global C02 emissions from oil of 31 MtC02 in the year 2030. Of this total, 85% (or 26 MtC02 in 2030) can be attributed to offshore oil leases covered by BOEM's Five-Year Program. And the reduction in greenhouse gas emissions would increase in the years after 2030. Yet because BOEM ignores the impacts of consuming the oil and gas to be extracted under its proposal, BOEM wholly fails to discuss how its proposal can possibly be consistent with the Paris Agreement and efforts to limit warming to l.5°C or even 2°C to avert the worst impacts of climate change. This failure violates NEPA.	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Atorney	CBD, BL, GRN, LBB, RAHC-7	Offshore oil and gas development consistently results in both chronic and disaster-related oil spills. For example, in 1979, an exploratory well in the Gulf of Mexico blew out and spilled 140 million gallons of oil over the course of 10 months. In 1989, the Exxon Valdese spilled more than 11 million gallons of oil into Alaska's Prince William Sound. In 2004, Hurricane Ivan hit the Gulf of Mexico off the coast of Louisiana toppling an offshore well platform owned by Taylor Energy, which has been leaking gallons upon gallons of oil every day for over a decade, and recent reports indicate a dramatic spike in the size of oil sheens and the volume of spilled oil since September, 2014. In 2009, the Montara oil rig spilled between 29,600 and 222,000 barrels of oil into the Timor Sea over the span of ten weeks. In 2010, BP's *Deepwater Horizon* rig exploded, causing estimated 206 million gallons of oil to spill into the Gulf of Mexico over the course of almost three months. These spills cause irreversible damage to marine and coastal environments, and the destructive impacts of large spills are immediate and severe. Oil spills and cleanup efforts are not just deadly to marine life, but also disruptive to ship traffic and detrimental to impacted shorelines, subsistence activities, commercial and recreational fishing, tourism, and the health of people living along the coast and people involved in clean-up efforts. Nevertheless, BOEM largely dismisses the impacts of a catastrophic oil spill because oil and gas activities are regulated and changes have been implemented since Deepwater Horizon. But this self-serving assumption contradicts several federal studies published since the disaster finding that sufficient regulatory changes are still lacking. For example, a recent government report issued by the	BOEM determined that, because a catastrophic event like the *Deepwater Horizon* explosion, oil spill, and response is not considered reasonably foreseeable as a result of a proposed action, the analysis should not be overly emphasized in this Multisale EIS to avoid confusion over whether it is or is not part of a proposed action. This is allowed under CEQ's regulations that removed the requirement to analyze worst-case scenarios. The key to managing the risk of such an event is to implement a rigorous regulatory regime to ensure that postlease drilling activities are conducted in a safe manner. It is at this stage that detailed information regarding a specific proposed action is available for review, including reservoir characteristics, infrastructure designs, and features, to ensure safety and reduce environmental risk. For a detailed analysis of reasonably foreseeable impacts associated with a low-probability catastrophic spill, such as the *Deepwater Horizon* explosion and oil spill, refer to the *Catastrophic Spill Event Analysis* technical report (USDOI, BOEM, 2017). Additionally, the work of Ji et al. (2014) defined a reasonable range of potentially catastrophic spill sizes and applied extreme value statistics to historical spill data to describe the statistical likelihood of the occurrence of a catastrophic oil spill. While there are competing analyses (e.g., Eckle et al., 2012), BOEM believes the Ji et al. (2014) provides a more robust statistical analysis by utilizing both extreme value statistical methods and complementary risk assessment methods to characterize the potential frequency of a catastrophic spill event.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		U.S. Chemical Safety and Hazard Investigation Board found that the causes of the Deepwater Horizon oil spill still have not been fully addressed, leading to the distinct risk that another catastrophic spill will occur, especially in the context of deepwater drilling. This is particularly alarming considering that BOEM's Five-Year Program suggests that oil and gas activity in the Gulf of Mexico will be focused on drilling increasingly deepwater wells: "the greatest undiscovered resource potential in the U.S. OCS is forecast to exist in the deep and ultra-deep waters of the [Gulf of Mexico]." In other words, oil companies will be drilling increasingly deeper wells-wells even deeper than that which led to the Deepwater Horizon spill-thereby increasing the risk of a catastrophic oil spill. Another recent report from the U.S. Government Accountability Office found that BSEE, BOEM's sister agency, "has not fully addressed deficiencies in its investigative, environmental compliance, and enforcement capabilities identified by investigations after the Deepwater Horizon incident." It concludes that "BSEE continues to face deficiencies in each of these capabilities that undermine its ability to effectively oversee offshore oil and gas development." In a nutshell, another Deepwater Horizon catastrophe is not a question of if, but a question of when. BOEM must therefore analyze the impacts of a catastrophic oil spill as part of the proposed action.	
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network,	CBD, BL, GRN, LBB, RAHC-10	In evaluating the environmental impacts of the proposed action, NEPA requires BOEM to consider and describe the direct, indirect, and cumulative impacts. Cumulative impacts are those impacts that "result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency	Thank you for your comment. Each resource chapter was reviewed, and clarifying language was added to ensure that the incremental, program, non-OCS, and reasonably foreseeable impacts were clearly identified. The cumulative impacts chapters for land

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Attorney		(Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time." BOEM's Draft EIS fails to adequately consider the indirect and cumulative impacts of its proposal to adopt the preferred alternative and auction off yet more of the Gulf of Mexico to oil companies. Specifically, BOEM wholly fails to actually analyze the impacts of the proposed action in light of other activities affecting the Gulf of Mexico because non-OCS activities generate more impacts, such as more air emissions than OCS activities. But NEPA requires agencies to consider *all* the significant impacts of their actions; it does not excuse consideration of one impact simply because another impact may be more significant. Moreover, BOEM often concludes that the cumulative impacts from its proposal will not be significant because it is not significant compared to all the other impacts that affect the Gulf of Mexico. But, as its name suggests, when conducting a cumulative impacts analysis, BOEM must *add* the impacts of its proposal to all other past, present and reasonably foreseeable future impacts, not just compare the impacts. BOEM's failure to conduct a proper cumulative impacts analysis renders its Draft EIS fatally flawed.	use/coastal infrastructure and social factors have been edited to more clearly describe the incremental impact of one proposed lease sale when added to all past, present, and reasonably foreseeable future events. For more information on BOEM's cumulative impacts analysis, refer to **Chapter 4.0.2.3**.
Sierra Club, Devorah Ancel, Staff Attorney	SC-1	BOEM must define the purpose and need for the proposed action based on an accurate picture of our nation's demand for and projected consumption of oil and gas in the decades to come. According to the EIA's energy outlook projections through 2040, crude oil consumption in the transportation sector will experience a gradual decline, underscoring that the need for new leasing and production is largely	The determination of the U.S. energy needs is based on the U.S. Dept. of Energy's Energy Information Administration's 2016 demand projections and is discussed in detail in the Five-Year Program. The Energy Information Administration is the principal Federal agency responsible for collecting, analyzing, and disseminating energy information to promote sound

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		absent. The widespread implementation of federal policies improving fuel economy throughout the transportation sector will further reduce overall domestic oil consumption. Oddly, the DEIS makes the following contradiction without explanation: while "consumption of liquid fuels will decrease"... the nation will need to "rely on more oil" in the years to come. BOEM cannot simply rely on these contradictory statements to justify further drilling development in the Gulf of Mexico. Further, the DEIS significantly overstates the nation's consumption of natural gas. The DEIS states that U.S. consumption of natural gas in 2014 was 25.26 trillion cubic feet per day. However, the DEIS conflates annual with daily consumption, resulting in an inflation of consumption by a factor of 365. Accor ding to the EIA, 2014 *annual* U.S. natural gas consumption totaled 26.70 tcf. BOEM must rectify any conclusions it reaches about the purpose and need for the proposed lease sales if they are based on this inflated figure. BOEM's conclusion that continued leasing and development of the Gulf is necessary as a long-term, stable energy supply and to provide economic security is in error. BOEM reasons that the current glut in onshore natural gas production and higher pricing on the world market is pushing industry to export excess natural gas, thus creating the need for additional offshore leasing. But, BOEM misses a critical point, evidenced by recent EIA and NERA studies, which is that as world demand and U.S. exports of natural gas increase, the accompanied increase in prices will cause U.S natural gas consumption to decline. BOEM's reasoning omits the critical point that a reduction in U.S. consumption will result, thus minimizing the demand for additional	policymaking, efficient markets, and public understanding of energy and its interaction with the economy and the environment. The Energy Information Administration forecasts future energy demand and supply based on current laws and regulations. BOEM relies on special runs performed by the Energy Information Administration's National Energy Modeling System (NEMS) to feed its MarketSim model that, in turn, is used to determine changes in energy demand and energy substitutes under the No Action alternative. The energy demand analysis from the Five-Year Program is incorporated into this Multisale EIS through the tiering process. This Multisale EIS analyzes environmental and economic impacts and benefits for the alternatives, including the proposed action and No Action alternative (i.e., no new leasing).

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		natural gas supplies. Given the huge glut of natural gas supply serving the world market and domestic demand, these studies affirm the absence of additional demand for new offshore sources of oil and gas supply. Moreover, the natural gas industry reports that the significant increase in unconventional natural gas production, due to technological advances such as horizontal and directional drilling and hydraulic fracturing, have led to a decrease in conventional production whereby conventional rigs such as those found in the offshore are mostly directed at oil drilling. Unconventional onshore natural gas plays are expected to comprise more than 80% of the natural gas production in the US by 2040, whereas conventional offshore production will decrease to approximately 6% of total production. Further, the American Petroleum Industry report and the EIA and NERA studies all show that although demand for natural gas will gradually increase over the next two decades, overall domestic supply will surpass U.S. consumption and world market export demand combined. In addition, domestic supply will continue to respond to market fluctuations, and has the capacity to supply both world market export and domestic consumption demands even as they increase according to projections in the coming decades. In addition, the high rates of onshore natural gas well shut-ins provide further evidence of the diminishing need to develop new offshore leases in the Gulf of Mexico under increased natural gas demand conditions. Because shut-in wells are readily capable of producing as market conditions become more favorable, the additional production capacity	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		could fulfill demand in the unlikely scenario that there is a supply deficit. BOEM also fails to acknowledge the sharp rise in exports of processed crude coming out of the Gulf Coast in recent years, and the potential for increasing exports given the recent lifting of the federal export ban for domestically produced raw crudes. Within this new context, Gulf of Mexico production may not actually serve domestic consumption needs as the Draft EIS contends. Thus, BOEM's unsubstantiated conclusion that new Gulf of Mexico leases are necessary to ensure domestic energy supply and economic security requires further analysis.	
Sierra Club, Devorah Ancel, Staff Attorney	SC-2	BOEM also fails to evaluate the state of existing offshore Gulf leases. As of 2016, more than 22 million acres of the Gulf of Mexico have been leased to the oil and gas industry, with additional lease sales scheduled in 2016. However, approximately 80% of the leased acreage has not yet been developed while much of the producing areas will continue to produce for the foreseeable future. These facts coupled with the glut of onshore natural gas supply and the projected decline in oil consumption in the decades to come are sufficient to meet current energy needs for the 2017 to 2022 period and beyond, thereby refuting BOEM's alleged need to lease the remaining unleased blocks of the Gulf of Mexico. The Draft EIS uses flawed reasoning and misinformation to erroneously narrow the purpose and need of the proposed action in order to justify leasing all remaining economically recoverable blocks of the Gulf. By asserting future energy demand is far greater than actual projections, BOEM has set itself up to select only one alternative and	BOEM is responsible for administering the leasing program for oil and gas resources on the OCS and for developing a 5-year schedule of proposed lease sales designed to "best meet national energy needs for the five-year period following [the schedule's] approval . . ." (Section 18 of the OCSLA [43 U.S.C. § 1344]). The Five-Year Program is an important component of the President's comprehensive energy strategy to allow for safe and responsible domestic oil and natural gas production as a means to support economic growth and job creation, and enhance energy security. As stated in Chapter 1.2 of the Five-Year Program EIS (USDOI, BOEM, 2016a), "Offshore oil and gas production represents approximately 11 percent of the total national oil and gas production. Domestic oil and natural gas supplies contribute to meeting domestic demand and enhance national economic security. The development of an OCS oil and gas lease sale schedule for 2017-2022 will facilitate domestic oil and gas production to meet this need." This Multisale EIS tiers from the Five-Year Program EIS, which provides an analysis of existing and future

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		reject all other possible action alternatives in violation of NEPA and OCSLA.	leases and their sufficiency to supply the Nation's energy needs. For the GOM's regionwide single lease sale analysis, all areas currently under lease are taken into consideration throughout the environmental analyses (i.e., cumulative impacts). The cumulative impacts analysis considers all of BOEM's past, present, and reasonably foreseeable future actions, as well as other non-OCS oil- and gas-related activities.
Sierra Club, Devorah Ancel, Staff Attorney	SC-7	NEPA requires BOEM to "describe the environment of the areas to be affected or created by the alternatives under consideration." Thus, the establishment of the baseline conditions of the affected environment is a fundamental requirement of the NEPA process. "Without establishing the baseline conditions which exist in the vicinity . . . there is simply no way to determine what effect the proposed [project] will have on the environment and, consequently, no way to comply with NEPA." BOEM lacks critical information regarding the effects of the Deepwater Horizon oil spill on the Gulf of Mexico. The Deepwater Horizon disaster resulted in the deaths of 11workers and caused a spill of approximately 206 million gallons of oil over the course of at least 87 days. More than 1,000 miles of shoreline were contaminated with oil; 88,522 square miles of ocean-totaling one-third of the Gulf of Mexico-were closed to commercial and recreational fishing; millions of animals were killed or harmed; and local residents were sickened. Six years later, the Gulf is still reeling from the effects	Thank you for your comment. BOEM acknowledges that there is some lingering uncertainty regarding the impacts of the *Deepwater Horizon* oil spill. However, this uncertainty has diminished as time passes and as new data and studies have become available. In addition, BOEM has complied with NEPA procedures for dealing with incomplete or unavailable information. BOEM has made some changes to this Multisale EIS in light of this comment in order to clarify the nature of the incomplete or unavailable information related to the impacts of the *Deepwater Horizon* oil spill on the baseline conditions of various resources. Current baselines are described for all resources under their respective "Description of the Affected Environment" chapters. Specific to the Trustees' PDARP/PEIS (Deepwater Horizon Natural Resource Damage Assessment Trustees, 2016), the altered baseline includes individual protected species directly affected by this unexpected unique catastrophic event. BOEM understands that each oil-spill event is unique and that its outcome depends on several factors, including time of year and location of the release relative to winds, currents, land, and sensitive resources, as well as specifics of the well and response effort. BOEM

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		of the spill. Recent studies demonstrate severe lung disease in dolphins; near-record lows of critically endangered Kemp's Ridley sea turtle nesting; oil dispersants toxic to corals and jellyfish; and a "bathtub ring" of oil on the seafloor. Another recent study published in April 2016 indicates that the spill impacted 19% more coastline that originally observed, finding that oil washed up on 1,313 miles of coastline along the Gulf of Mexico. In addition, the 50,000 people involved in cleanup efforts suffer from an increased risk of physical and psychological injury. Gulf residents are still suffering from increased symptoms of depression, anxiety, mental illness, and posttraumatic stress. However, the impacts of the spill are not yet fully understood and are still being studied. For example, the Natural Resource Damage Assessment, which assesses spill impacts to natural resources and informs future restoration is still underway. Moreover, BOEM has repeatedly admitted in other environmental review documents that there are data gaps regarding numerous resources in the Gulf of Mexico, including wetlands, coastal water quality, offshore water quality, air quality, commercial and recreational fishing and environmental justice, and that the impacts of the Deepwater Horizon oil spill on such resources may have changed baseline conditions. Further, BOEM has not yet completed its Section 7 consultation under the ESA following the Deepwater Horizon oil spill. BOEM therefore does not have an accurate picture of the effects that authorizing more offshore oil and gas leasing and drilling (including in the very same area where the Deepwater Horizon spill occurred) could have on already imperiled species.	also understands that the severity of impacts from an oil spill cannot be predicated on volume alone. BOEM has analyzed a low-probability catastrophic event (USDOI, BOEM, 2017) in conjunction with its analysis of potential effects, as requested by CEQ pursuant to its regulation at 40 CFR § 1502.22. A low-probability catastrophic spill is, by definition, not reasonably certain to occur. Other methods of analysis are significantly limited in their applicability and availability and they would not provide any meaningful or useful information to be used to assess the risk of a catastrophic spill occurrence at this programmatic level of OCS oil- and gas-related activities in the GOM. The return period of a catastrophic oil spill in OCS areas is estimated to be 165 years, with a 95 percent confidence interval between 41 years and more than 500 years (Ji et al., 2014). BOEM's produced-water data is collected from the Office of Natural Resources Revenue (ONRR). The ONRR's "Oil and Gas Operations Report" (OGOR) collects produced-water data, which can be found on ONRR's website at http://www.onrr.gov/ReportPay/production-reporting.htm). The OGOR-B report includes a disposition code to indicate how the produced water is disposed of (i.e., injected on lease, injected or transferred off lease, or disposed of). BOEM does not manage USEPA's data. It is likely that data collected in different databases will be different. Despite the difference, BOEM considers the potential impacts from the offshore discharge of produced water to be negligible beyond 1,000 m (3,281 ft) from the discharge point to moderate within 1,000 m (3,281 ft). The conclusions reached in this Multisale EIS remain the same, regardless of which estimate is used.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Accordingly, BOEM cannot properly define the environmental baseline, and BOEM cannot conduct a proper NEPA analysis unless and until these significant data gaps are filled. As such, any decision by BOEM to allow substantially more offshore oil and gas drilling is arbitrary and capricious.	In response to the harmful effects of produced water, additional language describing how USEPA regulates these discharges to prevent unreasonable degradation of the receiving waters has been added to **Chapter 4.2.2.1**. Regarding wetlands, please refer to the updated text in **Chapter 4.3**. The NRDA studies are ongoing, but the Trustees' PDARP/PEIS has been released and analyzed for relevant information. With the release of the Trustees' PDARP/PEIS, our understanding of the environmental impacts of the *Deepwater Horizon* explosion, oil spill, and response has greatly increased; however, there are many ongoing long-term and monitoring studies that are not complete. Therefore, our understanding of the lasting effects or long-term recovery of the system is still incomplete and has data gaps, but the information is not essential to a reasoned choice among alternatives. BOEM has revisited the baseline descriptions for the land use/coastal infrastructure and social factors sections and does not agree that enough evidence exists yet to conclusively determine that the *Deepwater Horizon* explosion, oil spill, and response has changed the baseline conditions. However, some additional clarifying language and references have been added to supplement the baseline descriptions and the cumulative impacts analysis contained in the Draft Multisale EIS.
Sierra Club, Devorah Ancel, Staff Attorney	SC-10	BOEM makes many decisions about the unique characteristics of deepwater drilling as well as other site specific decisions at the post lease stage. This includes reviews of oil spill response plans and exploration and development plans. The Draft EIS states that various mitigation stipulations may be required on a given lease but that Supplemental	The OCSLA requires a staged decisionmaking process beginning with the Five-Year Program, continuing through individual lease sales under the Five-Year Program, and ultimately to individual postlease activities requiring a permit or approval. As stated in **Chapters 1 and 2**, this Multisale EIS discusses all 10 Federal actions, i.e., 10 proposed

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Environmental Impact Statements will not be prepared for individual lease sales, thereby preventing the public from weighing in on the unique risks and areas of concern in a particular lease sale. This is especially troubling because BOEM's failure to consider the high-temperature/high pressure conditions and water depths in the Draft EIS risk assessment means that it makes critical decisions about the unique and high risk conditions of ultra-deepwater drilling at the post-lease stage without any public and essential stakeholder participation. As described in more detail below, BOEM's area-wide lease sale proposal encompasses a variety of diverse ecosystems and species habitat, as well as high risk landscapes that may require specialized protections and mitigation. Absent site specific impact analyses and mitigation determinations, certain regions may not be given the special protections they deserve. The deferral of analysis is particularly troubling given that site specific analysis often does not occur in the post-lease process as the Draft EIS states. Instead, environmental assessments often tier back to the leasing analysis. BOEM cannot escape performing site specific analyses by claiming it is done at later post-lease stages when it claims in those stages that the analysis was done at the leasing sale. This approach violates BOEM's duties under OCSLA to comply with NEPA and the ESA at every stage of the offshore oil and gas authorization process and its duty to ensure offshore developments are balanced with environmental safeguards and protection of the human, marine and coastal environments. Moreover, BOEM's approach also directly contradicts the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling's ("Commission") express recommendation that BOEM	regionwide oil and gas lease sales, as scheduled under the Five-Year Program. The multisale EIS approach is intended to focus the NEPA/EIS process on the staged OCSLA process for decisionmaking, including the proposed lease sales and any new issues and information identified since a prior stage. It also lessens duplication and saves resources when BOEM and BSEE conduct postlease reviews. Pursuant to NEPA, this Multisale EIS analyzes a range of alternatives, but NEPA does not require carrying all alternatives considered through a full analysis of impacts. BOEM has ensured that a reasonable range of alternatives to a proposed action, within the framework of the Five-Year Program, has been considered in this Multisale EIS. **Chapter 2.2.3** discusses additional alternatives considered but eliminated them based on the best available information currently available. As noted in **Chapter 1.3.1.2**, any individual lease sale could still be scaled back during the prelease sale process to offer a smaller area should circumstances warrant. Additionally, the issuance of leases does not conclude the environmental analysis of planned OCS oil- and gas-related activities. Each plan throughout the exploration, production, and decommissioning processes receives a site-specific environmental analysis pursuant to NEPA and the OCSLA's pyramidal structure going from large scale to site specific. For more information on BOEM's postlease processes, please refer to **Appendix A**.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		conduct environmental review on a finer geographic scale. BOEM's proposed area-wide lease sale approach in the DEIS makes post-lease analyses and decision making, and tiered assessments even more problematic. The area-wide lease sales combine 70 million acres from three separate planning areas - the Western Gulf, the Central Gulf and the Eastern Gulf - each with distinct ecological features. For example, the Western Region "hosts the northern most tropical coral reef system in the United States at the Flower Garden Banks, an isolated system of predominately encrusting corals atop salt dome formations." The system attracts reef fishes and large open-water species such as hammerhead and whale sharks. The Western Region is also "home to some of the most important nesting sites for the endangered Kemp's Ridley sea turtle." The Central Region is home to a resident population of endangered sperm whales, and the Eastern Region includes manatee habitat. The Louisiana coastline contains a variety of wetlands that make up one of the largest deltas in the world. Moreover, the line between the Western and Central Regions and the Eastern Region follows the De Soto Canyon off the coast of Alabama and traces the eastern edge of the Loop Current, which effectively divides the Gulf. The Gulf's size and variation clearly require greater specificity in the size and location of lease sales. By combining these diverse regions into a single analysis, BOEM violates OCSLA's express requirement to prepare a leasing program that consists "of a schedule of proposed lease sales indicating, as precisely as possible, the size, timing, and location of leasing activity." Further, this approach has been cited as particularly problematic by the Commission, which noted that the area-wide	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		leasing approach favors industry at the cost of meaningful environmental analysis. Expressly contradicting the Commission's conclusions and directives, as well as statutory requirements, BOEM asserts that it is proposing an area-wide approach to provide greater flexibility to industry and balance agency workload. BOEM does not have "carte blanche to wholly disregard a statutory requirement out of convenience." Nor can it abdicate its statutory duties under OCSLA or NEPA to appease industry. The designation lacks the precision required by statute and is therefore unlawful.	
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-2	Second, we want to state upfront our concerns with continued drilling in the Gulf, as contemplated in this EIS. Even without future leases, there are existing leases for much of the Gulf that will continue to operate, and BOEM must consider the impact of these existing leases as part of the process of looking at its future potential leasing. BOEM has already leased over 23 million acres of the Gulf to oil companies, and nearly three million acres of the Alaskan Arctic. Many of the leases in the Gulf of Mexico are relatively new leases, meaning that, by BOEM's own admission, production under these leases will last up to 70 years. BOEM's analysis wholly fails to consider why the OCS areas already under lease are not sufficient to supply the nation's energy needs while we transition away from dirty fossil fuels and toward clean, sustainable energy.	BOEM is responsible for administering the leasing program for oil and gas resources on the OCS and for developing a 5-year schedule of proposed lease sales designed to "best meet national energy needs for the five-year period following [the schedule's] approval . . ." (Section 18 of the OCSLA [43 U.S.C. § 1344]). The Five-Year Program is an important component of the President's comprehensive energy strategy to allow for safe and responsible domestic oil and natural gas production as a means to support economic growth and job creation, and enhance energy security. As stated in Chapter 1.2 of the Five-Year Program EIS (USDOI, BOEM, 2016a), "Offshore oil and gas production represents approximately 11 percent of the total national oil and gas production. Domestic oil and natural gas supplies contribute to meeting domestic demand and enhance national economic security. The development of an OCS oil and gas lease sale schedule for 2017-2022 will facilitate domestic oil and gas production to meet this need." This Multisale EIS tiers from the Five-Year Program EIS, which provides an analysis of existing and future
Gulf Restoration Network, Johanna de Graffenreid	GRN-2	There are currently enough leases to meet energy and market demands.	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Gulf Restoration Network, Howard Page	GRN-5	One, I would like to ask that we issue no new leases. 19 percent of the leases are being drilled right now. Extracted. That means 81 percent of our present capacity isn't even being used. So I would like to see a policy of no new leases …	leases and their sufficiency to supply the Nation's energy needs. For the GOM's regionwide single lease sale analysis, all areas currently under lease are taken into consideration throughout the environmental analyses (cumulative impacts). The cumulative impacts analysis considers all of BOEM's past, present, and reasonably foreseeable future actions, as well as other non-OCS oil- and gas-related activities.
Yolanda Ferguson	YF-1	Well, there -- you know, there's been -- we wonder about all the leases that are out there that have been drilled and left. You know, just have already been lease, but are there waiting. Why do we need to get new leases if we have all these leases that aren't producing wells?	
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-8	BOEM has failed to consider the large potential for alternative energy development in the Gulf, including offshore wind, floating solar, tide and wave technology and associated onshore development. While BOEM had considered a 50-mile offshore wind zone in the Atlantic as part of the programmatic EIS, it has failed to consider the validity of a similar zone along the Gulf to promote the use of alternative energy. While care would be needed to assure protection of migratory mammal and bird species in the development of offshore wind, solar or wave technology, the potential economic development, energy production and job creation is enormous and should not be undermined for a fuel with such significant public health and environmental consequences. We know that in Texas, several wind companies have been looking at offshore wind at least within the state-owned water and they have found valid potential. Yet BOEM is not considering the potential that we could be impacting future renewable development by opening up parts of the Gulf for oil and gas development.	BOEM determined that an analysis of the potential for alternative energy is outside the scope of this Multisale EIS for a proposed action. The purpose and need identified for this Multisale EIS is to provide an analysis of the environmental impacts of oil and gas leasing. However, BOEM does recognize the need to investigate the potential for alternative energy on the Federal OCS, and this is addressed in the Five-Year Program EIS (Chapters 1.4.6.1 and 2.7.4) from which this Multisale EIS tiers. BOEM's Office of Renewable Energy is responsible for developing an offshore renewable energy program in the Gulf of Mexico. Information on BOEM's renewable energy program, OCS leases, and renewable energy projects (34 proposed or currently in development) is available at on BOEM's website at http://www.boem.gov/Renewable-Energy/. Per Section 18 of the OCSLA, BOEM is required to develop a schedule of oil and gas lease sales on the OCS for 5-year periods. Thus, the OCSLA is the implementing legislation driving the purpose, and it is the law requiring the Secretary of the Interior to propose an action. The need is founded in the sources of energy consumption in the United States that were presented in the Draft Multisale EIS. The
Cyrus Reed	CR-1	So, these are just some observations I am going to make -- and I will do written comments – but No. 1 is: I feel like one of the alternatives that they didn't look at that they could have is the potential of the ocean's for alternative energy. And what I mean by that is,	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		this is an EIS about oil and gas leasing, but there is tremendous potential for offshore wind, we know from the studies that have been done in Texas. So, they could consider an alternative of having a zone set aside for offshore wind. There's other alternatives, like wave technology and tidal technologies, that they could look at because to me, that -- if you are going to do a true EIS, you need to look at all the alternatives, not just the oil and gas leasing. So, I would like them to consider that in the EIS as an alternative, either in lieu of offshore oil and gas leasing or at least as a part of it, you know, creating a -- say a 50-mile zone in the regions where there is sufficient wind to do that, I think would make a lot of sense because I think that's the way the world is going and I think we are going to eventually electrify our grid and we are not going to rely on oil and gas so much. You know, we will for a while, but not as much as we do today. So, I would like them to do that.	proposed action under NEPA is the proposed lease sales identified in the Draft Proposed Program, and the Draft Multisale EIS determined possible environmental impacts of a proposed action in comparative form to other lease sale alternatives allowable under Section 18 of the OCSLA, including the No Action alternative (i.e., no lease sale). Thus, the Secretary of the Interior has the ability to choose any of the alternatives, including the No Action alternative, after weighing possible benefits and adverse environmental impacts. The NEPA requires that agencies shall propose actions, and alternatives to that action, that meet the purpose and need. This means that decisions outside the scope of Section 18 of the OCSLA cannot be considered as reasonable alternatives (e.g., renewable energy substitutions and energy efficiency measures).
Rachel Walsh	RW-2	I also feel that the Bureau of Ocean Management fails to realize the great potential the Gulf has for alternative and renewable energy development including offshore wind, floating solar, tide and wave energy and associated onshore development. I think those are the types of things that we should be pursuing instead if we're serious about combating climate change.	
Hilton Kelley	HK-5	So, we need to do more to help protect our Gulf. We need to do more to explore renewable energies in ways we could get off of fossil fuels and ways we can save our wildlife. Because as we know, a lot of birds each year get caught in some of the oil spills because they can't differentiate whether or not it's water or oil in the water when they land and they are being destroyed.	
Robert Desmarais	RDS-2	This hearing is intended to discuss the environmental impacts of the planned leases. I can do that. The	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Sullivan		Draft Environmental Impact Statement available on the website is a rhetorical hodge-podge of deception from start to finish. It outlines in detail all possible impacts on all possible creatures, and it states that impacts on every living creature except human beings will be minor or negligible. Only on human beings is impact said to be important. It suggests the likelihood of an accident is minimal. This poppycock is unacceptable in a government document purporting to be scientific. We heard this routine years ago about the Deepwater Horizon. I am delighted at least that the walrus is not on its list of potentially impacted creatures. ...AND SO, VOILA! *As* requested, I have commented on the environmental impact statement, AND NOW I will address the question of whether there should even be leases at all....There would be no need to evaluate an environmental impact statement, if the arrogant perversion of the act of leasing was acknowledged The Gulf of Mexico is not for sale. The Bureau of Ocean Energy Management does not have the moral right to lease it. Our lands, waters and air are not mere resources for the petrochemical industry. They are the air, water and land of the human race....In addition, the President of the United States has signed the Paris Accords, which state that fossil fuels must be reduced in order to keep the Earth's temperatures below 1.5 degrees above pre-industrial levels, so the Gulf is being offered for lease in contradiction of this accord. Because the US has signed onto the accord, it is immoral if not illegal for these leases to be considered at all. If that moral principle is not recognized at this time, the young people will force recognition in coming years, furious with this generation's greed....This is a moral, not a legal, issue. Cleaning the planet is a moral, not legal, objective. Industry and government have no choice but to change. We have to keep the Earth	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		clean for our own survival. We do not need science to tell us this, though we have scientists telling us this....Right now in the first two weeks of May, we are seeing demonstrations around the world demanding we break free of fossil fuels. Residing in Louisiana, where our federal senators and all representatives except Cedric Richmond, deny that man's actions have to do with warming the Earth, we may of course be discouraged. We may *just* wonder where the denials come from. Then I remember. They come from elegant lunches with petrochemical-industry lobbyists. The Industry has known for years that burning fossil fuels produces climate change, but our officials somehow do not know.... We now live in a post-Paris world. The treaty was signed on April 20, Earth Day, by leaders of 175 countries, including the United States. It is a time to proclaim with dear voices and demonstrate with strong actions that we will create a new Louisiana with clean water, dean air, clean soil and clean energy.	
Ronald Kardos	RK-1	President Obama has concluded that we must move toward renewable energy sources and away from fossil fuel production and use.	Thank you for your comment. During preparation of this Final Multisale EIS, BOEM was working under President Obama's *The All-of-the-Above Energy Strategy as a Path to Sustainable Economic Growth* (All-of-the-Above Energy Strategy) (The White House, 2014), which has three main goals: to support economic growth and job creation; to enhance energy security; and to deploy low-carbon energy technologies and lay the foundation for a clean energy future. According to that plan, oil and natural gas supplies are integral to meeting national energy demand. For more information, please refer to The White House's website (The White House, 2014). This plan also aligns with President Trump's America First Energy Plan, which calls for energy policies that stimulate our economy, ensure our

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			security, and protect our health. For more information, please refer to The White House's website (The White House, 2017).
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-9	In addition, BOEM has failed to adequately analyze special places in the Gulf that deserve special protection. In addition to the needs of key species like sea turtles, and migratory birds, no leases should even be considered in, near or next to any topographic high marine ecosystems. Some of these topographic highs that should be provided additional buffer protection include East Flower Garden Bank, West Flower Garden Bank, Horseshoe Bank, Stetson Bank, Stetson Ring, Claypile Bank, 32 Fathom Bank, Applebaum Bank, Coffee Lump Bank, 28 Fathom Bank, McGrail Bank, Bright Bank, Rezak Bank, Geyer Bank, Elvers Bank, MacNeil Bank, Sonnier Bank, Bouma Bank, Sidner Bank, Parker Bank, Alderdice Bank, Jakkula Bank, 29 Fathom Bank and Rankin Bank. In particular, the Flower Garden Banks National Marine Sanctuary should have a large buffer area around any potential lease block. The BP Deep Horizon disaster showed what can happen at and below the surface when large quantities of oil and gas are released. "Russian Roulette" should not be played with the long-term health of these important topographic high marine ecosystems.	BOEM appreciates your comments and has considered them in preparing this Final Multisale EIS. Additional information has been added to **Chapter 2.2.3** regarding an alternative encompassing a potential boundary expansion of the Flower Garden Banks National Marine Sanctuary. Essentially, this Multisale EIS's Alternative D bounds the preferred alternative proposed by NOAA in the Draft Flower Garden Banks EIS. For more information on critical habitat for sea turtles, birds, or marine mammals, refer to **Chapter 4.9**.
	LSCSC-10	While we recognize that there is a separate process going on to consider expansion of the Flower Garden Banks Sanctuary through a separate process, we would strongly insist that no development be considered in the area near a potential expansion. Indeed, we believe a large buffer area must be considered whatever the decision on expansion of the Flower Garden area is. As an example, currently NOAA is considering five alternatives, with Alternative Five encompassing more than 930 square miles. BOEM should not consider any drilling in this large area.	

Table L-1.   Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		As NOAA states in the justification of the expansion discussion, "Additional exploration in the northwestern Gulf of Mexico has identified other reefs, banks and associated features that may be ecologically linked to FGBNMS and may also be highly vulnerable to certain human caused impacts. Although many of these areas have some level of protection through other designations, inclusion in the sanctuary would provide a comprehensive management framework to fill in the existing regulatory gaps and provide necessary protection to these critical habitats."	
ConocoPhillips, Richard Lunam, VP E&P, North America Exploration	CP-1	Conoco Phillips recommends that the BOEM apply the findings of its "Best Available Science" (BAS) analysis to operating scenarios that accurately reflect actual routine oil and gas activities. The BOEM should provide explicit documentation of what constitutes BAS, including the actual scientific experiments and practices currently in place, as well as how it was specifically applied to the MSEIS, including any rationale for its selection and use of BAS criteria. This can be achieved by the BOEM demonstrating its progression through the scientific method by clearly communicating its (i) foundation for and creation of hypotheses; (ii) experiments that test its hypotheses; (iii) detailed analysis and any conclusion(s) drawn. The experiments and analysis should be conducted using BAS strictly comprised of the most recently updated technology(ies) to monitor and assess realistic impacts of every day oil and gas activities. ConocoPhillips is concerned that the BAS that is utilized in the MSEIS process may not be applied in realistic settings consistent with standard oil and gas industry practices in use today or the foreseeable future. For example, in the 2014 Atlantic Programmatic Environmental Impact Statement, the BOEM purposely developed their study to be	The Department of the Interior has adopted the definition of scientific and scholarly integrity as the condition resulting from adherence to professional values and practices, when conducting and applying the results of science and scholarship, that ensures objectivity, clarity, reproducibility, and utility and that provides insulation from bias, fabrication, falsification, plagiarism, outside interference, censorship, and inadequate procedural and information security. For more information on this policy and for contact information for BOEM's Scientific Integrity Officer (http://www.doi.gov/scientificintegrity/Scientific-Integrity-Officers.cfm), visit DOI's webpage on the Integrity of Scientific and Scholarly Activities (http://www.doi.gov/scientificintegrity/index.cfm). The analysis in this Multisale EIS is centered on the application of credible scientific research. In the vast majority of these references, the methods used to conduct the research are explained. The studies cited in the references are publicly available and the "explicit documentation of what constitutes [best

Table L-1.   Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		conservative by modeling its acoustic monitoring impact on marine mammal analysis at the highest sound levels and always at maximum power and operation. Further, the model estimated marine mammal population densities affected by the over-simulated acoustics were likely exceeding actual population densities. Essentially, the agency adopted a worst-case scenario with an extremely low probability of occurrence, an approach inconsistent with the objectives of the 5 Year Plan and its subsequent administration. ConocoPhillips strongly advocates an appropriate application of the BAS approach and encourages replication of BOEM's inclusion of new and updated science as found in recent offshore EIS documents, such as that utilized in the Chukchi Sea Environmental Studies Program for the Alaska OCS. ConocoPhillips is opposed to the BOEM utilizing mitigations resulting from (i) the use of dated technologies for new studies or the reapplication of findings from previous studies that used out-of-date technology; and (ii) the use of any study outside the parameters of normal conditions where oil and gas activities are occurring.	available science] BAS" would be too extensive to detail in an EIS. However, in numerous places in this Multisale EIS, where it was considered important or when BOEM had derived independent methods for evaluating a resource, these methods are included in the descriptions in the text or specific methodologies were summarized, e.g., the calculation of OCS oil- and gas-related service vessels. BOEM's subject-matter experts have clarified in this Multisale EIS where incomplete or unavailable information may be essential to a reasoned choice among alternatives, if the information could be obtained or, if the costs of obtaining it are exorbitant, and that what scientifically credible information is available was applied using accepted scientific methodologies. BOEM has used the most relevant, up-to-date, and credible science throughout the preparation of this Multisale EIS, including throughout the development of the oil and gas hydrocarbon forecasts and activity scenarios. BOEM has presented a robust range to reasonably bound low and high activity levels for each alternative for each proposed lease sale. BOEM does not expect every proposed lease sale to reach the highest high or lowest low of the scenario forecasts but that it will fall within the reasonable range presented in **Tables 3-1 and 3-2**. BOEM continues to pursue and utilize the most relevant, up-to-date, and credible science in development of this Final Multisale EIS and subsequent NEPA documents.
Renate Heurich	RH-8	One concern, one thing that -- I also read that the studies that BOEM relied on, eight of the nine studies as far as the environmental impact is concerned were done by companies tied to the oil industry, and so what do you expect? It should be really independent studies, you know, not funded by the companies who obviously have their own interest.	
ConocoPhillips, Richard Lunam, VP E&P, North America	CP-2	ConocoPhillips supports BOEM's intent to analyze all of the Gulf of Mexico regardless of certain areas being excluded for 5 Year Plan activity as provided in the DPP. It is important to assess all of the Gulf of Mexico in the MSEIS as currently excluded areas may potentially be available for activity in future Five	BOEM's preferred alternative for a proposed action states that this alternative would offer for lease all available unleased blocks within the WPA, CPA, and EPA portions of the proposed lease sale area for oil and gas operations (**Figure 2-1**), with the following exceptions:

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Exploration		Year OCS Oil and Gas Leasing Programs due to increased efforts to emphasize safety and environmental awareness leading to fewer incidents. Since 2010, industry and federal government process improvements focusing on enhanced spill prevention and response have significantly strengthened the systems that ensure wells are drilled safely and with very little environmental impact.	(1) whole and portions of blocks deferred by the Gulf of Mexico Energy Security Act of 2006 (discussed in the *OCS Regulatory Framework* white paper [Cameron and Matthews, 2016]); (2) blocks that are adjacent to or beyond the United States' Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap; and (3) whole and partial blocks within the boundary of the Flower Garden Banks National Marine Sanctuary. (This boundary could be modified to encompass any future expansion to the Flower Garden Banks National Marine Sanctuary by NOAA.) Therefore, the areas of the EPA that were analyzed in this Multisale EIS are those regions not deferred by the Gulf of Mexico Energy Security Act and, due to early transboundary discussions with Mexico and Cuba, the area known as the northern portion of the Eastern Gap. To be clear, as of the publication of this Multisale EIS, the blocks are not being offered, just analyzed should they be included in a future lease sale after a Transboundary Agreement has been negotiated between the U.S., Mexico, and Cuba, and at which time a separate NEPA decision would be made.
ConocoPhillips, Richard Lunam, VP E&P, North America Exploration	CP-4	In conclusion, ConocoPhillips calls for a fair and justifiable MSEIS to help administer the GOM Lease Sales so that BOEM maintains access and activity levels as provided in the DPP. All portions of the Gulf of Mexico that have been ruled inaccessible for this 5 Year Plan should be analyzed in accordance with NEPA 's standards for potential environmental impact in order to provide reasonable foundation for	Thank you for your comment. The proposed lease sale area identified in the Area Identification memo was included for analysis for this NEPA document. The OCSLA mandates that BOEM reevaluate the OCS Oil and Gas Program every 5 years, and any potential expansion of the Five-Year Program would be evaluated at that stage.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		consideration in future Five Year OCS Oil & Gas Leasing Programs.	
Susan Feathers	SF-2	Concerns: the overall chart of potential impacts (EIS Chart) shows mostly negligible to minor impacts to beneficial impacts. Is there undo influence from oil and gas industries (money, Congressional pressure) that influence outcomes (even if unwarranted)! Just a question that, as a citizen, I must ask.	BOEM follows/implements a transparent NEPA process to ensure that all stakeholders (i.e., Federal and State agencies [comments and consultations], Tribes, nongovernment organizations, industry, and public comments/concerns) are aware of and are a part of the process. There are numerous opportunities for stakeholder involvement throughout the Bureau of Ocean Energy Management's NEPA process. The NEPA documents and analyses incorporate all relevant and important input from all stakeholders that was received during scoping and public comment periods. While the BOEM considers and evaluates all substantive relevant comments from the public, this remains a BOEM document meant to inform the decisionmaker and the public of reasonably foreseeable impacts from a proposed action and its alternatives. BOEM employs a team of highly trained technical staff of subject-matter experts who develop the analyses based on rigorous scientific reviews, consultations with other Federal and State agencies, expert opinions, and all relevant and important stakeholder considerations. Impacts are avoided and/or reduced through BOEM's multi-step NEPA mitigation process. Impacts are mitigated at both the regional level (i.e., lease sale) and also at the plan/permit, site-specific level. In addition, to further reduce any appearance of conflicts of interest, MMS (BOEM's predecessor) was reorganized into BOEM, BSEE, and ONRR, which are three strong, independent agencies. The

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			reorganization was designed to remove potential conflicts by clarifying and separating missions across three agencies and by providing each of the new agencies with additional resources necessary to fulfill those missions.
Restore Mississippi Sound, Sharon Hayes, Director	RMS-6	In addition, the EIS is required to address ecosystem services, which are the value to people of nature's benefits. Not taking into account how passionately people feel -- people on the coast feel about the Gulf and its drilling resources, again, grossly understates the cost of drilling. There are well-accepted, stated preference methods in the literature that would take that into account, but the preparers of the EIS chose not to use them. Instead using the habitat equivalency model, which does not address people's preferences. It's only based on restoration costs. It's interesting that stated preference or contingent valuation models would not be utilized given that the economist Dr. Kenneth Arrow pioneered such models during Exxon Valdez oil spill and received the Nobel Prize in economics for doing so.	Thank you for your comment. In the fall of 2015, a joint memorandum ("Incorporating Ecosystem Services into Federal Decision Making") from the Executive Branch (i.e., CEQ, Office of Management Budget, and Office of Science and Technology Policy) was released; it supports the application of the ecosystem services approach, when applicable, to the Federal Government's resource management responsibilities. This memorandum was followed up by a Departmental effort to respond. The Department of the Interior's Office of Policy Analysis has marshalled DOI's agencies by directing a coordinated response that is centered on a departmental work plan. This work plan calls for the formation of a DOI ecosystem services community of practice that aims to build DOI's ecosystem services capacities and further its engagement through the following: a query into the utility of creating department-wide guidance on the application of ecosystem services; an investigation into the utility and feasibility of DOI's ecosystem services standards; the identification of an ecosystem services research agenda; the identification of ecosystem services data gaps; the vetting and identification of useful ecosystem services analytical tools; and a plan to foster ecosystem services capacity building in the Federal Government. BOEM's subject-matter experts recognize the utility of the ecosystem services approach in supporting natural resource decisionmaking. BOEM is in the process of conducting an internal assessment to

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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			identify where this analytical tool is useful (e.g., program, scale, and phase of decision process), to identify ecosystem services information needs, and to assess ecosystem services deficiencies and competencies within BOEM. BOEM's subject-matter experts believe that an ecosystem services approach is likely to be helpful in some cases and less so in others. They are working to develop a BOEM strategy for identifying appropriate decision processes for an ecosystem services approach, assessing the necessary requirements and adequacy of data, and are cooperating with the Office of Policy Analysis to recognize the long-term nature of the effort required for BOEM to achieve ecosystem services objectives.
Apalachicola Riverkeeper	AR-3	The discussion in Section 4.16 regarding Irreversible and Irretrievable Commitment of Resources and 4.17 regarding Relationship Between the Short-term Use of Man's Environment and the Maintenance and Enhancement of Long-term Productivity provides insight to the industry's acceptance of permanent losses of a variety of public resources. Taking such losses for granted falls short of recognizing that many of the impacts and losses considered short-term are actually long-term - and are for all practical purposes, irreversible. Section 4.17 suggests that short term use of Man's environment justifies some loss of the long term productivity of the Gulf of Mexico. It also assumes that that loss of productivity will eventually come back. Experience has shown that the duration and degree of the impacts has been underestimated and therefore undervalued, again with the effect of minimizing the costs of the impacts and overestimating the benefits.	The purpose of this NEPA document is to disclose all of the potential issues associated with a proposed action so that the decisionmaker has the best information available on which to make the decision on whether and how to proceed with a proposed lease sale. The purpose of **Chapters 4.16 and 4.17** is to detail for the decisionmaker any potential irreversible or irretrievable commitments of resource and how the short-term decision to offer a proposed lease sale could impact the long-term productivity of the GOM. In order to achieve this, BOEM uses the best available credible scientific information.
United States Environmental Protection Agency	USEPA-1	In the Executive Summary, the DEIS identifies the affected environment of analysis to encompass 133 counties and parishes in five states with over 22.7 million residents. Also, it states the impacts of	Thank you for your comment. BOEM will address each of USEPA's recommendations separately. Recommendation 1: BOEM has utilized the

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		the proposed action would be immeasurable for environmental justice since low-income and minority communities are located on-shore, distant from Federal OCS oil and gas-related activities. Further, BOEM has determined that the proposed action would not produce environmental justice impacts, since these vulnerable populations are located within the larger context of on-shore and State-regulated nearshore oil and gas activities that are connected to downstream infrastructure over which BOEM has no regulatory authority. Table 1 identifies environmental justice impacts to be minor. *Recommendation:* EPA recommends utilizing the Promising Practice Report (https://www.epa.gov/sites/production/files/2016-5/documents/iwg promising practices final 5- 16-201 6.pdt) to supplement the applicable requirements for considering and analyzing environmental justice populations. We recommend the FEIS accurately discuss impacts to environmental justice and Tribal populations, within, along the boundaries, and near the proposed action's operations and activities. EPA recommends consolidated discussions of direct, indirect, and cumulative impacts to EJ and Surrounding Communities and proposed mitigation thereby making it readily accessible and in layman's terminology. We recommend utilizing EJ tools and methods (i.e. EJ Screen, U.S. Census Bureau, and area knowledge) in identifying the low income and minority population within or near the proposed project	Promising Practice Report in its analysis and has determined that the environmental justice impact conclusion will remain the same. Recommendation 2: A proposed action's operations and activities are offshore (3 mi [5 km] or more offshore). There are no environmental justice or Tribal populations living within or along the boundaries of a proposed action's operations and activities. However BOEM has considered neighboring environmental justice communities in **Chapter 4.13.3.3**. Recommendation 3: BOEM discusses direct, indirect, and cumulative impacts to environmental justice and surrounding communities as a facet of the social factors analysis; however, BOEM has no onshore authority to propose or establish onshore mitigations. The language has been modified to be clearer to the reader. Recommendation 4: Neither the environmental justice screen nor the U.S. Census Bureau contain data regarding low-income and minority populations within or near the proposed project's boundaries since those boundaries are 3 mi [5 km] or more offshore in the waters of the Gulf of Mexico. The operations and activities regulated by BOEM occur several miles offshore where people do not live. The OSHA governs working conditions on rigs and platforms. BOEM has no regulatory authority over any onshore activities, including onshore activities that are located near low-income and minority populations. BOEM has no authority to control the actions of onshore facilities. All onshore facilities are permitted and regulated by State environmental oversight agencies, i.e., USEPA and OSHA. Please refer to **Chapter 4.14.3.3** for BOEM's detailed

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		boundaries, and avoid the use of averaging in determining environmental justice population or communities. EPA recommends consideration of public comments in the selection of an alternative that minimize any disproportionately high and adverse human health or environmental impacts on minority and low-income populations or individuals.	environmental justice determination. Recommendation 5: Public comments are eagerly sought and considered by BOEM in selecting an alternative.
United States Environmental Protection Agency	USEPA-13	The DEIS identifies BOEM initiated formal consultation with U.S. Fish and Wildlife Service (USFWS). However, the DEIS does not contain a final determination on the environmental consequences of the alternatives. *Recommendation:* EPA recommends the incorporation of USFWS and other State Agencies concurrence on impacts of the proposed project, and a commitment for mitigation, if applicable.	BOEM and BSEE have submitted Biological Assessments to both NMFS and FWS, and are actively engaged with them in consultation concerning all of our past and reasonably foreseeable future activities. Until the above-mentioned formal consultation with NMFS is complete, BOEM is under an interim consultation agreement with NMFS. The NMFS and FWS understand the types and levels of activities BOEM is engaged in and have not raised concerns with our ongoing activities. They are fully informed of the potential impacts identified in this Multisale EIS, as well as in the Biological Assessments. Copies of the interim concurrence letters can be found in **Appendix K**.
United States Environmental Protection Agency	USEPA-16	In Table 1 Alternative Comparison Matrix, archaeological resources impacts are identified as negligible under all four Alternatives. However, in Section 4.13, the DEIS identifies various scenarios where the potential impact could range from beneficial to major. Further, it states that it is impossible to evaluate the potential impact to an archaeological site from a project action at the programmatic level, and each permitted action during post-lease activities would be assessed for site-specific impacts during the permit application process.	**Table 1** in the **Executive Summary** represents the expected impacts to an archaeological resource if all mitigations, based on up-to-date archaeological survey requirements, are implemented and followed. It does not represent the range of impacts to archaeological resources should an impact occur. This convention was chosen for this table because the impact levels to different resource categories were evaluated in a way that is most appropriate for each resource, but it may not be uniform among the different resources. As an early planning effort, BOEM initiated a request for comment on the NOI for this Multisale

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		Recommendation: EPA recommends the FEIS includes, as applicable, State and Tribal Historic Preservation Officers concurrence and incorporate any issues raised by the State and Tribal Historic Preservation Officers, as applicable, in Louisiana, Texas Mississippi, Alabama, and Florida, and how the impacts will be addressed and/or mitigated.	EIS via a formal letter to each of the affected Gulf Coast States on April 3, 2015. A 30-day comment period was provided. The State Historic Preservation Officers for Alabama (refer to Comment AHC-1), Florida, and Louisiana responded via formal letters, all concurring that no historic properties will be affected. The Florida State Historic Preservation Officer further requested to be notified and given the opportunity to comment should any cultural resources be identified off the Florida coast. BOEM has received no additional correspondence concerning any issues raised by State and Tribal Historic Preservation Officers concerning how the impacts will be addressed and/or mitigated.
Topic 3 - Alternatives			
American Petroleum Institute (API), Andy Radford	API-10	Table 1 on pp. xvi-xvii of the DEIS contains an "Alternative Comparison Matrix" comparing the impacts of each alternative on all of the major environmental receptors analyzed in the DEIS. According to the table, for most environmental receptors (including live bottoms, fishes and invertebrates, air and water quality, protected species, and recreational activities), the impacts of the proposed lease sales are anticipated to be "beneficial" to "moderate."[1] However, the conclusions about the degree of impact in the matrix appear to be at odds with the conclusions in the environmental impact analyses in Chapter 4, many of which contemplate impacts greater than those identified in the matrix. While it is possible that this can be explained by BOEM's assumption that certain mitigation measures will be imposed and obeyed by lessees, BOEM should nevertheless explain and rectify the apparent discrepancy between the impacts identified in Table 1 and those identified in the impact analyses contained in Chapter 4. This will help avoid confusion and ensure that the public and the	BOEM has revised **Tables 1 and 2-2** to better reflect the resource-specific tables and text analyses found in **Chapter 4**, including separation of OCS oil- and gas-related and non-OCS oil- and gas-related cumulative impacts. Not all possible mitigating measures can be explained at length in this Multisale EIS since they are, by necessity, site specific/case dependent. There is a site-specific environmental review of OCS oil- and gas-related activities that are submitted as plans or permits. Conditions of approval are applied at that time. Where appropriate, each resource chapter describes the types of mitigating measures that can be applied at the site-specific review level. Commonly applied mitigating measures during the postlease process are described in **Appendix B**. Specifically, for **Chapter 4.4** (Deepwater Benthic Communities), the general types of protective measures are identified and summarized in the respective subsections titled "Historical Protections of Deepwater Benthic

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		decision-maker fully understand the anticipated environmental effects of the proposed lease sales. For example, the matrix concludes that the impacts to deepwater benthic communities will be "negligible to minor" across all alternatives. Yet the impact analysis for deepwater benthic communities in Chapter 4.4 indicates that the potential impacts to benthic communities could be "major" in a number of respects unless "mitigation" is applied. See Table 4-6 at p. 4-96. Although BOEM discusses certain "protective measures" contained in nonbinding guidance documents such as Notices to Lessees, and pre-existing legal requirements that tend to minimize certain impacts to benthic communities, BOEM does not appear to point to any particular mitigation measure or combination of measures that would reduce the nominally potentially "major" impacts of the proposed action(s) on benthic communities to the "negligible to minor" level identified in the matrix at Table 1. In such situations, BOEM should clearly identify the mitigation measures it proposes to impose on OCS operators to achieve the desired impact level or, in the alternative, revise the level of anticipated impacts to reflect the possibility that the impact could be greater than that currently identified in the Alternative Comparison Matrix at Table 1.	Communities" and "Historical Protections of Live Bottom Habitats." The range of impact conclusions in relation to the application of mitigating measures is also discussed on pages 4-20 and 4-21 of the Draft Multisale EIS.
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts	CBD, BL, GRN, LBB, RAHC-11	BOEM's Draft EIS Fails to Analyze a Reasonable Range of Alternatives: In the alternatives analysis, an agency must "provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact." The analysis must "rigorously explore and objectively evaluate all reasonable alternatives." While an agency is not obliged to consider every alternative to every aspect of a proposed action, the agency must "consider such alternatives to the proposed action as may partially	Thank you for your comment. BOEM has ensured that a reasonable range of alternatives to a proposed action, within the framework of the Five-Year Program, has been considered in this Multisale EIS. For a description of the alternatives considered but not analyzed, refer to **Chapter 2.2.3**. In that chapter, there are discussions on the alternatives excluding loggerhead sea turtle critical habitat and the De Soto Canyon and an alternative that would exclude Mississippi Canyon or other sperm whale high-use areas (with additional

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Attorney		or completely meet the proposals goal." In its Draft EIS, BOEM considered five alternatives: (A) region-wide lease sales in the Gulf of Mexico (the proposed alternative); (B) region-wide lease sales excluding available unleased blocks in the Western Planning Areas; (C) region-wide lease sales excluding available unleased blocks in the Central and Eastern Planning Areas; (D) Alternatives A, B, or C with the option to exclude unleased blocks subject to the topographic features, live bottom and/or blocks south of Baldwin County, AL lease stipulations; and (E) no new lease sales (the purported no action alternative). Even if BOEM properly limited its purpose and need statement (which it did not), BOEM unreasonably ruled out alternatives that would restrict oil and gas development, even if they would have met the "need" of holding lease sales to further the development of OCS oil and gas resources. As such, BOEM failed to "rigorously explore" and "objectively evaluate" all reasonable alternatives. For example, BOEM failed to examine an alternative that would prohibit new oil and gas leases in designated critical habitat for the Northwest Atlantic loggerhead sea turtle distinct population segment. This habitat is essential for the survival and recovery of these imperiled sea turtles given its importance for several live-stages including development, foraging, and cover. BOEM must consider such an alternative, particularly in light of its acknowledgement that the cumulative impacts of ongoing offshore oil and gas activities on the OCS is expected to result in a number of chronic and sublethal effects on sea turtles that could have population-level impacts. BOEM also failed to consider an alternative that would prohibit new oil and gas leases in the Mississippi Canyon to protect sperm whales because biological data does not support such an exclusion. However, as BOEM is well aware, the Mississippi Canyon is the site of the	justification added; a full analysis of marine mammals, including sperm whales, can be found in **Chapter 4.9.1**), and additional information has been added regarding an alternative encompassing a potential boundary expansion of the Flower Garden Banks National Marine Sanctuary, as well as other alternatives. Further, any alternative to delay activities is analyzed in this Multisale EIS as Alternative E. The No Action alternative is a cancellation of a single lease sale, and a new decision will be made for the next proposed lease sale in the Five-Year Program. BOEM has discussed climate change in Chapter 4.2.1 and Appendix C of the Five-Year Program EIS, including additional discussions of U.S. and global commitments to mitigating climate change. Please refer to the response to Comment CBD, BL, GRN, LBB, RAHC-2 for more information on alternatives and fundamental changes to improve the management of offshore leasing and drilling since publication of the 2011 Commission Report and to the response to Comment CBD, BL, GRN, LBB, RAHC-5 for more information related to the Paris Agreement and BOEM's treatment of downstream greenhouse gas emissions as a result of leasing in the Gulf of Mexico.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		Deepwater Horizon catastrophe. Accordingly, the Mississippi Canyon suffered significant exposure to oil and toxic dispersants. Given the persistence of oil in the marine environment, the Canyon may be contaminated for decades. A study of sperm whales in the Canyon following the spill found nickel and chromium—two genotoxic metals found in Macondo oil—that were two to five times higher than the global mean for the species. And, as explained above, other wildlife is still suffering the impacts of the oil spill and cleanup efforts, such as corals, jellyfish, and sea turtles. A ban on new leasing in Mississippi Canyon would help protect these species from further disruption caused by new offshore oil and gas activities. BOEM's cursory dismissal of this alternative from further consideration was improper. BOEM also failed to consider excluding the De Soto Canyon from availability for leasing. The De Soto Canyon is important habitat for a variety of species, including Bryde's whales, sperm whale and other cetaceans. Virtually all reported sightings of Bryde's whales have occurred within the De Soto Canyon, suggesting a highly restricted range. A recent study by the National Marine Fisheries Service suggests that the population is isolated and evolutionarily distinct from all other Bryde's whales examined to date, indicating that the species may be a distinct subspecies. Recent abundance estimates put the population's size at fewer than 40 animals, meaning it is highly vulnerable to impacts from oil and gas activities. Accordingly, BOEM should consider excluding this area from its proposal. In addition, BOEM failed to examine an alternative that would prohibit drilling activities in and around areas where ESA-listed corals are found in the Gulf of Mexico. This is despite BOEM's express acknowledgment that corals are particularly vulnerable to disturbance and that "due to their relatively low population sizes,	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		any impacts form accidental events on ESA-listed corals would have a magnified effect on each of those species." BOEM also arbitrarily dismissed expanding the exclusion zone for the Flower Garden Banks National Marine Sanctuary. BOEM stated it did not further consider expanding the exclusion area because the proposed expansion is still in the early planning stages. But BOEM has independent authority to restrict the areas where offshore oil and gas activities occur under OCSLA. And the fact that the National Marine Fisheries Service is even considering expanding the Sanctuary indicates that the area contains important and biologically diverse marine life, including species that are particularly vulnerable to oil and gas activities and spills such as corals. BOEM should therefore consider such an alternative. As described above, oil spills occur as a matter of course in the Gulf of Mexico; lease stipulations related to avoiding bottom disturbance cannot change this reality. BOEM also failed to examine alternatives that would otherwise limit development and production activities, such as an alternative that would limit the number of wells that could be drilled under its proposal or an alternative that would prohibit the use of particularly dangerous drilling activities such as offshore fracking and acidizing. BOEM also failed to consider an alternative that would end all new offshore oil and gas leasing pending a plan to limit warming to 1.5º or 2ºC. BOEM's failure to consider such an alternative is particularly troubling considering recent reports finding that ending new offshore leases will lead to reductions in global greenhouse gas emissions and that BOEM has already leased over 22 million acres of the Gulf of Mexico to oil companies. Many of the leases in the Gulf of Mexico are relatively new leases, meaning that, by BOEM's own admission, activities under these leases will last up to 70 years.	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		BOEM's analysis wholly fails to consider why the OCS areas already under lease—many of which are inactive—are not sufficient to supply the nation's energy needs while we transition away from dirty fossil fuels and toward clean energy. BOEM must consider this, along with the need and national policy to transition to clean energy sources and development of renewable energy from the OCS. Finally, BOEM failed to consider an alternative that would institute a regional citizens' advisory council in the Gulf of Mexico. The Commission recommended the formation of such an advisory group in the Gulf of Mexico, and that it represent the broad community interests in the areas, including the fishing and tourism industry, and be funded by oil and gas lease holders. The council of stakeholders would provide ongoing, independent research and recommendations for environmental safeguards of offshore drilling and transportation.	
Sierra Club, Devorah Ancel, Staff Attorney	SC-3	The Range of Alternatives Fails to Incorporate Additional Protections for Highly Sensitive Ecosystems and Habitat: BOEM's range of alternatives lacks consideration of sensitive ecosystems and habitats encompassed in the proposed lease area including: designated critical habitat for the Northwest Atlantic loggerhead sea turtle distinct population segment; sperm whale habitat in the Mississippi Canyon, Bryde's whales, sperm whale and other cetacean habitat in De Soto Canyon; and habitat for ESA-listed corals found in the Gulf's Western and Central Planning Areas. At a minimum, BOEM must consider alternatives that prohibit leasing and development in these highly sensitive areas, as well as consider an alternative that expands the exclusion zone for the Flower Garden Banks National Marine Sanctuary.	
Lone Star Chapter of the	LSCSC-3	Third, BOEM seems to be offering a false choice. The options analyzed under the DEIS seem to be full	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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Sierra Club (LSCSC), Cyrus Reed, Conservation Director		leasing, leasing in one of the zones or none essentially. There seems to be little consideration of very limited zones for drilling, or increased no-drill zones. Instead, BOEM is relying on its large "Western," "Central" or "Eastern" zones and little ability to limit areas within those areas. While Option D offers some variability by adding some restrictions on drilling in certain areas, again it is a very limited option with no consideration of other options. NEPA requires a "detailed statement" of "alternatives to the proposed action," which is considered "the heart of the environmental impact statement." But BOEM's alternatives analysis is seriously lacking. Even if BOEM properly limited its purpose and need statement (which it did not), BOEM unreasonably failed to consider alternatives that would restrict oil and gas development, even if they would have met the "need" of holding lease sales to further the development of OCS oil and gas resources. For example, BOEM failed to consider an alternative that would prohibit drilling in certain biologically sensitive areas, such as critical habitat for imperiled loggerhead sea turtles; an alternative that would restrict the number of wells to be drilled; or an alternative that would end all new offshore oil and gas leasing pending a plan to limit warming to 1.5º or 2ºC.	
Cyrus Reed	CR-10	And I have got some -- you know, I've got a final comment. Just that NEPA really does require to look at a -- all the alternatives to the proposed action, but, again, the Actions A, B, C, D, and E, you know, are really just -- I mean, E is different because it's no leasing, but the other ones are really just small variations. And, so, I really would want them to look at the need overall of holding these leases. I would want them to look at an alternative that would really prohibit drilling in certain sensitive areas and an alternative that would restrict the number of wells to	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		be drilled and how they could meet sort of the, you know, the overall Paris accord of keeping global warming to below 1.5 or 2 degrees Celsius. How does drilling fit into that overall plan and how much would be allowed?	
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Attorney	CBD, BL, GRN, LBB, RAHC-12	BOEM Failed to Adequately Consider the No-Action Alternative: Moreover, BOEM's analysis of Alternative E—the "no-action" alternative—is inadequate. BOEM repeatedly states that the no action alternative means that the lease would not occur under the Five-Year Program for 2017-2022, but could occur in a future five-year program. Thus, according to BOEM, the no-action alternative encompasses the same potential impacts as a decision to delay the lease sale to a later time. But this approach "avoid[s] the task actually facing [BOEM]. In assuming that, no matter what, the proposed activities would surely occur, [BOEM is] neglecting to consider what would be a true 'no action' alternative." In addition, in considering the cumulative impacts of Alternative E, BOEM simply states that the impacts of adopting this alternative will "depend on the extent to which the public were to interpret it as a signal of a policy change that would continue into future lease sales." This cursory statement wholly fails to satisfy the agency's duty to rigorously explore and objectively evaluate the no-action alternative. Further, it ignores the fact that the United States has committed, along with more than 190 other countries, to avoid the worst effects of climate change by limiting warming to 2 °C or less, and that science tells us that we must limit the supply of fossil fuels if we are to meet this commitment. This clearly necessitates a change in policy, since under a business-as-usual approach, the world would warm to over 5 °C by the end of the century.	The OCSLA requires a staged decisionmaking process, beginning with the Five-Year Program, continuing through individual lease sales under the Five-Year Program, and ultimately to individual postlease activities requiring a permit or approval. At the lease sale stage of the OCSLA process, BOEM typically evaluates all individual lease sale decisions in one or more GOM planning areas under the Five-Year Program in a multisale EIS. As stated in **Chapters 1 and 2**, the multisale approach discusses all 10 Federal actions, i.e., 10 regionwide oil and gas lease sales, as scheduled under the Five-Year Program. The multisale EIS approach is intended to focus the NEPA/EIS process on the staged OCSLA process for decisionmaking, including the proposed lease sales, and any new issues and information identified since a prior stage. It also lessens duplication and saves resources. Though 10 proposed regionwide lease sales are encompassed in the Five-Year Program, the impact analyses within this Multisale EIS specifically address resource impacts associated with holding one proposed lease sale, i.e., proposed Lease Sale 249. Therefore, the No Action alternative associated with the analyzed Federal proposed action is the cancellation or delay of a single proposed lease sale, i.e., proposed Lease Sale 249. A separate decision point and new NEPA analysis (e.g., a Determination of NEPA Adequacy, Supplemental EIS, or EA, as applicable) will be undertaken for the other nine proposed regionwide lease sales (e.g., proposed Lease Sale 250) and will include any potential differences or updates for a
Sierra Club, Devorah	SC-4	The DEIS Fails to Properly Consider a "No Action" Alternative: BOEM fails to put forward a true no	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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Ancel, Staff Attorney		action alternative. Alternative E, which BOEM calls the "No Action" alternative, only would "cancel a single proposed lease sale" rather than all ten proposed leased sales that would occur under the proposed action in the 2017 to 2022 period. Further, in rejecting the "No Action" alternative, BOEM assumes that the cancellation of any single proposed lease sale in the five year period is simply a postponement of that lease sale to a future lease sale and therefore any production activity and associated potential environmental impacts resulting from the cancelled lease sale would simply be deferred to a later date. This reasoning disregards entirely the fact that any single lease sale or all ten proposed lease sales combined are not needed now or anytime in the future based on current and projected oil and gas market conditions described above. Indeed, market projections demonstrate that a true "no action" alternative that permanently cancels the proposed leases would in fact allow for continued production of oil and gas without obligating the U.S. to continue oil and gas development the Gulf of Mexico well past 2022. Moreover, by framing the No Action Alternative as the cancellation (or postponement) of only a single lease sale rather than cancellation of the full swath of lease sales proposed for the five year period, BOEM ignores the full extent of damages that could be avoided by a true No Action Alternative. Indeed, no new leasing would reduce the potential for oil spills and other destructive impacts of oil and gas exploration and development; avoid the release of billions of tons of greenhouse gases and other pollutant discharges to the water and air; and avoid additional negative impacts to wildlife and local communities already impacted by the BP oil spill disaster and subsequent oil spills. Without any analysis of the benefits to the marine, coastal and human environments of a permanent	proposed action and any new information available at that time. If a single proposed lease sale would be cancelled, under the OCSLA, BOEM would be required to consider any proposed lease sales remaining in the current Five-Year Program, if applicable, or proposed as part of a future Five-Year Program. Therefore, a decision to cancel a single proposed lease sale will not alter future decisions for proposed lease sales in the GOM, as required by the OCSLA. The decision point is at the individual proposed action or lease sale stage. By selecting the No Action alternative and avoiding those activities associated with a proposed lease sale, those potential impacts related to a single proposed lease sale would be avoided; however, please be advised that a decision to cancel a single proposed lease sale would not preclude activity related to past lease sales or decisions on future lease sales. There are a number of currently leased blocks within the proposed lease sale area with proposed plans, and BOEM anticipates another decision point for the proposed lease sale, which is proposed as part of the Five-Year Program. Should the No Action alternative be selected, in the interim, industry may explore and develop their existing portfolio of leaseholds subject to the terms of those leases and any conditions of approval for plans or permits. An individual decision or a series of decisions on proposed lease sales in a given planning area may influence industry's decisionmaking or strategy to develop existing leases. In this context, the No Action alternative does not explicitly presume an identical proposal or one that is only delayed into the future. As noted

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		cancellation of the new leases, BOEM simply concludes that any adverse economic impacts to companies and federal government revenues of cancelling (or postponing) a single lease take precedent. This conclusion plays into the longstanding culture of appeasing industry interests to maximize profits at all costs which has led to the disastrous consequences of rampant permitting and development of the offshore. Further, the conclusion that cancellation of leases will adversely impact federal revenues fails to acknowledge the fact that even the industry's desire to invest in the Gulf is dwindling. The recent March 2016 lease auction garnered a total of only $156 million in bids, the fourth lowest total in the Gulf's Central District since 1983. Notably, no bids were received for auctions blocks in the Eastern Planning Area. BOEM's concerns about declining revenues fail to compare the benefits of a few hundred million dollars in revenues to the enormous costs associated with a single disastrous blow out or the thousands of frequently occurring oil spills. Indeed, the costs of clean-up and restoration, as well as costs to communities and the tourism industry of an oil spill disaster, on the order of billions of dollars, dwarf any benefits conferred by declining federal government revenues. At the very least, BOEM must consider and analyze a permanent no lease sale option. Given the current state of inactive existing offshore oil and gas leases, gas production nationally, and the ongoing and potential impacts of drilling activities, a true no action alternative that permanently cancels lease sales proposed for the 2017-2022 period balances oil and gas development with protection of the human, marine and coastal environments. In fact, it is the only possible option that comports with BOEM's mandate under OCSLA.	above, under the OCSLA, BOEM would be required to consider any proposed lease sales remaining in the current Five-Year Program, if applicable, or proposed as part of a future Five-Year Program. As such, each proposed lease sale will have its own decision point. Analyzing a permanent no lease option is outside the scope of this Multisale EIS. Cancellation of all 10 proposed lease sales in the Five-Year Program was analyzed in the Five-Year Program EIS (USDOI, BOEM, 2016a), from which this Multisale EIS is tiered.
Gulf	GRN- 1	Gulf Restoration Network is disappointed in the lack	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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Restoration Network, Johanna de Graffenreid		of "No Action Alternative" research in the EIS. A thorough exploration of a no-action alternative is essential to ensuring that all Gulf communities, waters, and wetlands are protected.	
Stated Preference for an Alternative			
American Petroleum Institute (API), Andy Radford	API-5	The Multisale DEIS considers five alternatives for the proposed lease sales. API strongly supports Alternative A (the Preferred Alternative) for the 10 GOM lease sales proposed to be held from 2017 through 2022 as described below: Alternative A (Preferred) would offer for lease all unleased blocks within the proposed WPA, CPA, and EPA portions of the proposed lease sale area for oil and gas operations, with the following exceptions: (1) whole and partial blocks deferred by the Gulf of Mexico Energy Security Act of 2006; and (2) blocks that are adjacent to or beyond the United States' Exclusive Economic Zone in the area known as the northern portion of the Eastern Gap. (3) whole and partial blocks within the Flower Garden Banks National Marine Sanctuary (i.e., the boundary as of publication of this Multisale EIS) API is strongly opposed to Alternatives B, C, D, and E for the GOM lease sales. The analysis in the DEIS does not support the adoption of such restrictive alternatives. Adoption of Alternative A is fully consistent with the agency's analysis.	Thank you for your comment. We note that your preferred alternative is Alternative A. The Secretary of the Interior oversees the OCS oil and gas program and is required to balance orderly resource development with protection of the human, marine, and coastal environments while simultaneously ensuring that the public receives an equitable return for these resources and that free-market competition is maintained. The decision on whether and how to proceed with each proposed lease sale is under the authority of the Assistant Secretary for Land and Minerals Management and will be disclosed in the Record of Decision following publication of this Final Multisale EIS.
Paul Siegele, Chevron	CHEVRON-1	I encourage the Interior Department to finalize a 2017-2022 offshore leasing program without excluding any further areas or imposing further restrictions. Proceeding otherwise would pose risks to the nation's economic and energy security. It would also reduce revenues to the US government and negatively affect the livelihoods and communities across the Gulf Coast.	
Eddie Pharr, Spectrum Geo	SPECTRUM-1	In the Gulf of Mexico, we fully support maintaining all ten Gulf of Mexico lease sales without any further	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		restrictions.	
Kellan Lyman	KL-1	I believe the best interest of the people of the Gulf is to have no new leases for the oil and gas industry because the industry has demonstrated that they're unable to operate cleanly and has an unacceptable level of pollution, which damages Louisiana's natural heritage and livelihood. These impacts are detrimental to the ecosystem and economy.	Thank you for your comment. We note that your preferred alternative is Alternative E. The Secretary of the Interior oversees the OCS oil and gas program and is required to balance orderly resource development with protection of the human, marine, and coastal environments while simultaneously ensuring that the public receives an equitable return for these resources and that free-market competition is maintained. The decision on whether and how to proceed with each proposed lease sale is under the authority of the Assistant Secretary for Land and Minerals Management and will be disclosed in the Record of Decision following publication of this Final Multisale EIS.
Brenda Warger	BW-1	I came here today because I would like to say that I am in opposition to the sale of new leases for oil and drilling in the Gulf because they will deepen the climate crisis and reverse the course on President Obama's commitment to combat climate change. I urge you to halt all new oil and gas lease sales in federal water and keep these dirty fossil fuels in the ground.	
Rachel Walsh	RW-1	I believe that we need to have no new leases in the Gulf of Mexico. I believe that we need to leave the oil and gas in the ground if we're going to effectively combat climate change. We need to be pursuing renewable energy as opposed to selling new oil and gas leases. Climate change is primarily driven by the combustion of fossil fuels which poses a severe threat to health, welfare, ecosystems, and the economy of the United States and the world. The Paris Climate Agreement was signed by 197 countries, including the United States, and it requires rapid and robust emission reductions to be effective, therefore, it's important to restrict new leases from being sold because halting new oil and gas leases off our coasts would keep up to 62 billion tons of carbon emissions in the ground.	
Alabama Chapter of the Sierra Club, Carol Adams-Davis	ACSC-2	Please take action to cancel lease sales for the Central Planning Area of the Gulf of Mexico. These sales continue the dangerous disconnect between the administration's climate goals and the continued leasing of federal lands and waters for fossil fuel	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		extraction.	
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-4	The Lone Star Chapter Believes That the No New Leasing -- Option E -- is the Option the Administration Should Pursue	
No New Leases Form Letter	NNL-5	That's why BOEM must adopt the no action alternative and end new oil and gas leasing in federal waters. It's the right policy move and now is the right time.	
Apalachicola Riverkeeper	AR-6	To this end, the "No Action Alternative" should be the preferred alternative until the recommended precautions are available, improved clean up and response are possible, and impacts are better understood and/or known. To expand an industry that is causing significant impacts in the face of a reality where the need for oil and gas is declining and being replaced by energy production that does not result in such short and long term impacts to the health and productivity of the Gulf of Mexico is inconsistent with protection of the public interest. We strongly support the NO Action Alternative.	
Sky Yardley	SY-1	Every drop of oil extracted has potential to leak. Deepwater Horizon, oil trains crashing, methane releases in California, other places. … ·Leave the oil and the gas in the ground so we can all live.	
Andrea Alexander	AA-1	Natural resources like the Gulf of Mexico should NOT be bought and controlled by wealthy corporate interests, just like government officials should be public servants only and should NOT be bought and paid for by wealthy corporate interests. The lands, waters, and wildlife of America really belong to us, the people -- if anyone-- but you corrupt government officials have robbed us of our heritage,	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		just like you robbed the Native Americans not so long ago. You've handed our priceless forests, parks and refuges, wildlife, and marine resources over to ruthless, insatiable corporate entities who are ravaging, polluting, exhausting, and utterly ruining our beautiful planet -- all to satisfy their greed. I've lived along the Gulf of Mexico my entire life, and I am absolutely disgusted by the recklessness of drilling and extraction companies. THey have decimated and destroyed so much marine life in the Gulf, from oysters and shellfish, to dolphins and whales, to pelicans and shorebirds, to turtles and so many other elements of the food web. They have decimated the seafood industry and injured the tourist industry along the Gulf Coast. They have decimated the habitat for so many creatures that call this area home and which are essential for our survival and our culture. They have no regard for all the people, wildlife, and natural resources they have displaced and ruined. And now, our government, once again, is willing to throw us to these wolves. Again. Governments who hand over the lifeblood of the people (which the Gulf of Mexico is to us who live here) to these greedy uncaring companies (most of whom send their profits to foreign citizens and countries) are TRAITORS to their country and undeserving to be in power. Shame on you government criminals. Traitors, every one of you who condone these companies that exploit what we have and give nothing back in return.	
Community Advocate	CA-3	I urge BOEM to adopt the no-action alternative for the entire Gulf of Mexico. Further, BOEM should end	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		plans for new oil and gas leasing in "ALL' federal waters of the US Outer Continental Shelf.	
David Hilfiker	DH-1	Please remove all Arctic, Atlantic, and Gulf oil and gas leasing from the 2017-2022 Proposed Program.	
Diana Tomlinson	DT-1	I am writing to demand a termination to all new oil and gas leases in federal waters in the Gulf of Mexico. The Bureau of Ocean Energy Management is considering lease options for five year beginning in 2017. This would allow drilling over the next 70 years putting wildlife and coastal communities at risk. Each time there is an oil spill thousands of endangered organisms are at risk as well as recreational and commercial fisheries. For the past six years, the Gulf of Mexico has been on a recovery path from all of the damage sustained by the Deepwater Horizon disaster and has a long way to go to be as healthy as it once was. Any new drilling would lead to more offshore developments and accelerate the potential of spills and accidents. This is why it is prudent to close off any new drilling in the Gulf of Mexico.	
Erica Heimberg	EH-1	I am writing to demand a termination to all new oil and gas leases in federal waters in the Gulf of Mexico. The Bureau of Ocean Energy Management is considering lease options for five year beginning in 2017. This would allow drilling over the next 70 years putting wildlife and coastal communities at risk. Each time there is an oil spill thousands of endangered organisms are at risk as well as recreational and commercial fisheries. For the past six years, the Gulf of Mexico has been on a recovery path from all of the damage sustained by the Deepwater Horizon disaster and has a long way to go to be as healthy as it once was. Any new drilling would lead to more offshore developments	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		and accelerate the potential of spills and accidents. This is why it is prudent to close off any new drilling in the Gulf of Mexico.	
J Conn	CONN-1	I urge the Bureau of Ocean Energy m Management to maintain regionwide leasing in the Gulf of Mexico.	
James Mulcare	JM-1	I am writing to demand a termination to all new oil and gas leases in federal waters in the Gulf of Mexico. The Bureau of Ocean Energy Management is considering lease options for five year beginning in 2017. This would allow drilling over the next 70 years putting wildlife and coastal communities at risk. Each time there is an oil spill thousands of endangered organisms are at risk as well as recreational and commercial fisheries. For the past six years, the Gulf of Mexico has been on a recovery path from all of the damage sustained by the Deepwater Horizon disaster and has a long way to go to be as healthy as it once was. Any new drilling would lead to more offshore developments and accelerate the potential of spills and accidents. This is why it is prudent to close off any new drilling in the Gulf of Mexico.	
Jane McBride	JMB-1	Please end all new offshore oil and gas leasing in public waters.	
Jason Hannon	JH-1	The next 70 years??? We are beyond the "need" for fossil fuels. Anything oil can do, hemp can do better and sustainably! Which can also enrich the ecosystem, rather than pollute it further. Enough is enough, no more "Drill Baby, Drill!" As we sit on the precipice, we need to reach for the future, rather than dragging our feet in the past. Or you can continue to show us who bought and paid for you with these utterly moronic decisions, and we'll gladly see you replaced by whatever means necessary.	
Jeff Cobb	JC-1	No new oil leases. Humanity has already found 5 times more fossil fuel reserves than we can burn	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		and stay under the 1.5 degrees Celsius temperature increase signed in the Paris agreement.	
Joanna Nasar	JN-1	I am writing to demand a termination to all new oil and gas leases in federal waters in the Gulf of Mexico. The Bureau of Ocean Energy Management is considering lease options for five year beginning in 2017. This would allow drilling over the next 70 years putting wildlife and coastal communities at risk. Each time there is an oil spill thousands of endangered organisms are at risk as well as recreational and commercial fisheries. For the past six years, the Gulf of Mexico has been on a recovery path from all of the damage sustained by the Deepwater Horizon disaster and has a long way to go to be as healthy as it once was. Any new drilling would lead to more offshore developments and accelerate the potential of spills and accidents. This is why it is prudent to close off any new drilling in the Gulf of Mexico.	
John Kersting	JK-1	I'm writing to ask that all new offshore leases for drilling be removed from the 2017-2022 Outer Continental Shelf Oil and Gas Leasing Program and that you use your authority to permanently protect the Arctic and Atlantic from all new oil and gas leasing, forever. Like the Atlantic Ocean, the Arctic should not be opened for drilling, and instead of new lease sales in the Gulf of Mexico, we need a plan to transition communities to a clean, renewable energy economy.	
Kim Schultz	KS-1	Please, I beg you not to allow further drilling in the Gulf of Mexico. I've done my part by writing this letter to you. Now it's up to you to be brave and do what you know is right in your heart; not your head, but your heart.	
Leah Gentry	LG-1	I ask you to grant no new oil or gas leases in the Gulf of Mexico. It has been proven over and over again that this is risky business for our environment, for sea	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		life, for anyone who lives near a coastline, for the future well being of all living beings. Leave it in the ground. Resources would be far better used to enhance the development and use of alternative fuels. Please please take no action on new oil and gas leases; not today, not ever. The Earth's future is hanging in a delicate balance; and part of that balance is held in your hands. Please, do the right thing and just say no.	
Margie Vicknair-Pray	MVP-1	Considering the major affronts to the Gulf in recent years, including the recent spill by Shell less than 100 miles south of Port Fourchon, LA, I would hope that someone of intelligence and power in your agency will have made an assessment that drilling in the Gulf of Mexico is killing not only the Gulf, but the Louisiana coastal marshes, and eventually the entirety of oceans of the world. You can't possibly believe that this is a good thing. I'm giving you credit for having some basic intelligence and a lack of greed.	
Melissa Fleming	MF-1	It is imperative that we protect frontline communities and marine wildlife from offshore drilling and halt all new oil and gas leases in the Gulf.	
Michelle Macy	MM-1	There should be NO more offshore drilling. I think the Valdez disaster and the BP fiasco should serve as somber reminders of why not.	
Rebecca Parsons	RP-3	I strongly urge you to stop all new oil and gas leases, and carry out the will of the President and the American people.	
Ronald Kardos	RK-3	The U.S. Department of the Interior, Bureau of Ocean Energy Management should not consider the sale of more off shore drilling rights in the upcoming 2017-2022 Gulf of Mexico OCS Oil and Gas Lease Sales.	
Sally Stevens	SS-1	BOEM must therefore adopt the no-action alternative and end new oil and gas leasing in federal waters.	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Such action is necessary to protect our climate, oceans, coastal environments and local communities from dangerous offshore drilling.	
Suzanne Cohen	COHEN-1	We cannot protect our coast with all of the drilling that is going on now. Please help us protect our coast.	
Topic 4 – Environmental Issues and Concerns			
Climate Change			
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Attorney	CBD, BL, GRN, LBB, RAHC-6	BOEM Failed to Adequately Consider Climate Change Impacts on the Ocean and Coastal: Environment: In addition to failing to address the impacts of consuming the oil and gas extracted under its proposal, BOEM failed to adequately describe baseline conditions related to climate change or consider the impacts of climate change on the ocean environment. While BOEM's analysis acknowledges that climate change is occurring and incorporates the analysis in the Draft EIS on BOEM's Five Year Program, its analysis is cursory and fails to properly disclose the enormity of the problem, or the contribution of its proposal to the problem. For example, BOEM fails to adequately analyze the impacts of ocean acidification over the course of its proposal and its proposal's contribution to these significant environmental problems. BOEM also failed to adequately consider increased storm severity and sea level rise. Greenhouse gas pollution is causing the oceans to acidify at an alarming rate. The ocean's absorption of anthropogenic carbon dioxide is changing its chemistry, lowering its pH and causing ocean acidification. Surface ocean pH has already dropped by about 0.1 pH units from 8.16 in 1800 to 8.05 today, resulting in a rise in surface ocean acidity of about 30 percent. The pH of the ocean is changing rapidly at a rate 100 times anything seen in hundreds of millennia, and may drop by another 0.3 or 0.4	Additional language was included in the analysis of impacts to water quality (**Chapter 4.2**), marine mammals (**Chapter 4.9.1**), deepwater benthic communities (**Chapter 4.4**), and live bottom habitats (**Chapter 4.6**) to address ocean acidification. Currently, there is insufficient information on ocean acidification, potential effects, and response of biota, and any mention would be too speculative for this Multisale EIS. There are many different species of harmful phytoplankton and many different types of harmful algal blooms, and to speculate as to which types would be enhanced or suppressed in the GOM due to ocean acidification is unduly speculative and not possible at this time. With respect to domoic acid and *Pseudo-nitzschia* blooms in the northern Gulf of Mexico, it has been demonstrated that domoic acid is capable of entering coastal food webs; and a vector species (i.e., the Gulf menhaden) has been identified (Del Rio et al., 2010). However, the levels of toxicity observed in that study are orders of magnitude lower than those of the west coast of the United States. A more recent study has identified toxicity concentrations in the same magnitude as those on the west coast, but note that no pelagic animal strandings have occurred (Bargu et al., 2016). At the present level of understanding, it

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		(resulting in a 100–150% increase in acidity) by the end of this century. If carbon dioxide emissions continue unabated, resulting changes in ocean acidity could exceed anything experienced in the past 300 million years. Even if carbon dioxide emissions stopped immediately, the ocean would continue to absorb the excess carbon dioxide in the atmosphere, resulting in further acidification until the planet's carbon budget returned to equilibrium. A primary impact of ocean acidification is that it depletes seawater of the carbonate compounds—aragonite and calcite—that many marine organisms need to build shells and skeletons. As a result, ocean acidification hinders species such as corals, crabs, sea stars, sea urchins, and plankton from building the protective armor they need to survive. Rising acidity also affects the basic functions of fish, squid, invertebrates, and other marine species, including detrimental effects on metabolism, respiration, and photosynthesis, which can thwart their growth and lead to higher mortality. Because of its serious impacts to so many species, including those at the base of the food chain, ocean acidification threatens to disrupt the entire marine food web. Ocean acidification also decreases the sound absorption of seawater, causing sounds to travel further with potential impacts on whales and other marine mammals that may be sensitive to the noises created by vessel traffic, seismic surveys, military sonar, and other noise pollution. In addition, ocean acidification has the potential to profoundly affect the growth and toxicity of phytoplankton associated with harmful algal blooms ("HABs"). HABs can cause mortality in marine mammals through contamination of food sources. Some strains of phytoplankton in HABs produce copious amount of domoic acid, a kanic acid analog neurotoxin. Exposure to this toxin via food sources	would be far too speculative for this Multisale EIS to assess the impacts of ocean acidification on harmful algal blooms in the GOM. While it is possible that, as a result of climate change, both the number and severity of hurricanes may increase, the Bureau of Ocean Energy Management's OSRA estimates the risk of oil-spill contact to sensitive offshore and onshore environmental resources and socioeconomic features. Included in this analysis are trajectory simulations based on historical surface ocean currents and winds, which incorporate periods of hurricane conditions. In addition, BSEE provides a robust set of regulations relating to hurricane preparedness that help lower the risk of oil spills occurring and help prevent any loss of life. The effects of hurricanes on coastal areas and oil and gas structures are discussed in **Chapters 3.1.6.1 and 3.2.1.1** and in the resource sections in **Chapter 4**. The effects of climate change and sea-level rise on coastal areas is discussed in **Chapters 3.3.2.8.1 and 3.3.2.10** and in the resource sections in **Chapter 4**. Louisiana's land loss has been acknowledged in the Multisale EIS, but the contribution from the oil and gas industry has been more from inshore activities, such as the dredging of location canals through marshes, as opposed to OCS oil- and gas-related activity. Separating the causes of such land loss is difficult, but one study estimated that the total of direct and indirect impacts from OCS oil- and gas-related activities from 1955 to 1978 accounted for 21,863-49,884 ha (54,024-123,266 ac), or 8-17 percent of Louisiana's total wetland loss (Baumann and Turner, 1990; Turner and Cahoon,

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		can affect the brain, causing seizures, provoke organ failure, and ultimately death in several marine mammal species, from small sea otters, seals, sea lions, to large whales. In the past three decades, HABs seem to have become more frequent, more intense, and more widespread. BOEM also failed to consider how the increased frequency of hurricanes and other severe weather events and sea level rise will impact coastal areas and oil and gas infrastructure. As noted by the Environmental Protection Agency in finding that greenhouse gases endanger public health and welfare: Observed sea level rise is already increasing the risk of storm surge and flooding in some coastal areas. The conclusion in the assessment literature that there is the potential for hurricanes to become more intense (and even some evidence that Atlantic hurricanes have already become more intense) reinforces the judgment that coastal communities are now endangered by human induced climate change, and may face substantially greater risk in the future. Even if there is a low probability of raising the destructive power of hurricanes, this threat is enough to support a finding that coastal communities are endangered by greenhouse gas air pollution. In addition, coastal areas face other adverse impacts from sea level rise such as land loss due to inundation, erosion, wetland submergence, and habitat loss. The increased risk associated with these adverse impacts also endangers public welfare, with an increasing risk of greater adverse impacts in the future. In fact, from 1932 to 2010, coastal Louisiana has lost about 1.2 million acres, equating to coastal wetlands disappearing at a rate of about a football field per hour. The oil and gas industry admits that it is responsible for at least 36% of the total loss of this area, though the Department of the Interior has stated that the industry could be responsible for as	1987). BOEM provides estimates of the impact of OCS oil- and gas-related activity on coastal wetlands and beaches in this Multisale EIS based on currently available information. It is also important to note that the proposed lease sales discussed in this Multisale EIS are set for future dates and that, currently, the Secretary of the Interior has requested the agencies in the Department of the Interior to identify potential compensation for projects that are being proposed. Coastal storms, hurricanes, and sea-level rise are addressed in the land use/coastal infrastructure and social factors chapters based on existing peer-reviewed research. Some language and resource references have been added to the chapters to expand the discussion of these issues. For additional information on greenhouse gas emissions, please refer to the response to Comment CBD, BL, GRN, LBB, RAHC-5.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		much as 56% of the loss. And scientists say that at current rates, coastal erosion and sea level rise will lead to nearly all of Southeast Louisiana to be under water by 2100. Yet BOEM fails to adequately analyze these impacts or how its proposal will contribute to these problems. Moreover, while BOEM's analysis admits that hurricanes and other extreme weather events can damage pipelines and infrastructure resulting in a release of oil, BOEM's analysis fails to analyze how increased storm severity in the face of climate change will increase the risks of oil spills, accidents and other environmental harms associated with offshore oil and gas drilling in the Gulf of Mexico. The failure to do so violates NEPA.	
Sierra Club, Devorah Ancel, Staff Attorney	SC-9	BOEM Failed to Adequately Consider Climate Change Impacts on the Ocean and Coastal Environment: In addition to failing to address the impacts of consuming the oil and gas extracted under its proposal, BOEM's environmental analysis fails to adequately consider the impacts of climate change on the ocean environment. While BOEM acknowledges that climate change is occurring, its analysis of the impacts of that change is cursory, fails to properly disclose the enormity of the problem, or the contribution of the proposed action to the problem. For example, BOEM fails to adequately analyze the impacts of ocean acidification over the course of its proposal. The ocean's absorption of anthropogenic carbon dioxide is changing its chemistry, lowering its pH and causing ocean acidification. Surface ocean pH has already dropped by about 0.1 pH units from 8.16 in 1800 to 8.05 today, resulting in a rise in surface ocean acidity of about 30 percent. The pH of the ocean is changing rapidly at a rate 100 times anything seen in hundreds of millennia, and may drop by another 0.3 or 0.4 (resulting in a 100–150% increase in acidity) by the	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		end of this century. If carbon dioxide emissions continue unabated, resulting changes in ocean acidity could exceed anything experienced in the past 300 million years. Increased ocean acidification has significant adverse impacts on marine organisms. Among many other impacts, increased ocean acidity hinders species such as corals, crabs, seastars, sea urchins, and plankton from building the protective armor they need to survive. Rising acidity also affects the basic functions of fish, squid, and invertebrates, impeding growth and increasing mortality. Ocean acidification threatens to disrupt the entire marine food web. BOEM also failed to consider how the increased frequency and severity of hurricanes and sea level rise will impact coastal areas and oil and gas infrastructure. Sea level rise is already increasing the risk of storm surge and flooding in coastal areas. Coastal communities are endangered by the potential for more intense hurricanes and weather events caused by human induced climate change. The adverse impacts of sea level rise, including land loss, erosion, wetland submergence and habitat loss, directly threaten Gulf of Mexico's coastal states. Louisiana has lost more than one million acres of coastal wetlands over an 80 year period. The Department of the Interior has stated that the industry could be responsible for as much as 56% of the loss. And scientists say that at current rates, coastal erosion and sea level rise will lead to nearly all of southeast Louisiana to be under water by 2100. Yet BOEM fails to adequately analyze these impacts or how its proposal will contribute to these problems. Moreover, the DEIS violates NEPA because it fails to analyze how increased storm severity in the face of climate change will increase the risks of oil spills, accidents and other environmental harms associated with offshore oil and gas drilling and infrastructure in the	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Gulf of Mexico.	
Cyrus Reed	CR-2	I am also -- you know, I have gained an understanding that it's in the programmatic EIS where they do all the climate change analysis. That being said, I feel like this EIS should at least acknowledge that, you know, climate change is real and that further oil and gas leasing and oil and gas drilling will lead to more, not less, impacts on climate change and I feel like it should be addressed in the EIS, and it would be a reason to say we -- you know, alternatively we don't want to do more oil and gas drilling because of those issues.	
Brenda Warger	BW-3	And finally my last statement I guess is that I'm in opposition additionally because while BOEM's EIS acknowledges that climate change is occurring, it fails to properly disclose the enormity of the problem and the contribution of expanded off shore oil drilling in the Gulf would have to the problem and that's all I have to say.	
Kim Ross	KR-3	Also the other problem with methane leaks impact climate change and that's probably the number one issue with the Environmental Impact Statement is that it doesn't address this document which intends to have lease sales over the next five years but that impacts the next 50 plus years. That climate change is not adequately addressed from that perspective for we know that in the next 50 to 100 years we'll be seeing major impacts from sea level rise and other things so climate change is not adequately addressed in the Impact – Environmental Impact Statement.	
Renate Heurich	RH-6	We have other parts of the world, like the Arctic and the Middle East. The Arctic is heating up extremely fast with permafrost melting and increased sea level rise, which is especially a problem here for us in New Orleans.· Sea level rise is going to continue for hundreds of years scientists tell us.· And it is -- we	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		already see a lot of melting happening of glaciers in the Arctic. … Also, what -- so those are like huge impacts that are mentioned, but not really weighed. You know, the severity of it was not really evaluated sufficiently, I think.	
Rebecca Parsons	RP-1	Your proposal will undermine the Paris Agreement to limit global warming to 2 degrees C. Your proposal will undermine President Obama's commitment to take action on climate change.	
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-13	BOEM's Draft EIS fails to adequately describe baseline conditions related to climate change or consider the impacts of climate change on the ocean environment. While BOEM acknowledges that climate change is occurring, its analysis is cursory and fails to properly disclose the enormity of the problem, or the contribution of expanded offshore oil drilling in the Gulf of Mexico, to the problem. For example, BOEM fails to adequately analyze the impacts of ocean acidification over the course of its Proposal, and its Proposal's contribution to these significant environmental problems. BOEM admits that hurricanes and other extreme weather events can damage offshore oil and gas pipelines and infrastructure resulting in spills, but fails to analyze how increased storm severity in the face of climate change will increase the risks of oil spills, accidents and other environmental harms associated with offshore oil and gas drilling in the Gulf of Mexico. The failure to do so violates NEPA.	This Multisale EIS tiers from the Five-Year Program EIS, which describes the baseline conditions due to climate change. Additional information has been provided in **Chapter 4.1** (Air Quality) of this Multisale EIS as well. In regards to ocean acidification, additional language was included in the analysis of impacts to water quality (**Chapter 4.2**), marine mammals (**Chapter 4.9.**1), deepwater benthic communities (**Chapter 4.4**), and live bottom habitats (**Chapter 4.6**) to address ocean acidification. Currently, there is insufficient information on ocean acidification, potential effects, and response of biota, and any mention would be too speculative for this Multisale EIS. While it is possible that, as a result of climate change, both the number and severity of hurricanes may increase, the Bureau of Ocean Energy Management's OSRA estimates the risk of oil-spill contact to sensitive offshore and onshore environmental resources and socioeconomic features. Included in this analysis are trajectory simulations based on historical surface ocean currents and winds, which incorporate periods of hurricane conditions. In addition, BSEE provides a robust set of regulations relating to hurricane preparedness that help lower the risk of oil spills
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-15	BOEM must develop a climate change ecological resilience and resistance plan (CCERRP), assessing the full biological and ecological elements in the Gulf of Mexico and the affects that climate change has had and will have on them. A CCERRP would assist plants, animals and ecosystems to adapt to climate change and would require monitoring of changes and	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		mitigation measure effectiveness.	occurring and that help prevent any loss of life. The effects of hurricanes on coastal areas and oil and gas structures are discussed in **Chapters 3.1.6.1 and 3.2.1.1** and in the resource sections in **Chapter 4**. Your suggestion of creating a climate change ecological resilience and resistance plan will be considered for implementation as BOEM policy.
Katrina Dubytz	KD-3	And then we strongly believe that BOEM must develop a climate change ecological resilience and resistance plan to assess the full biological and ecological elements in the Gulf, and thus assist and manage the deeply important plants, animals and ecosystems as they adapt to climate change.	
Harriett Myers	HM-2	We need to be reducing our use of oil rather than drill in unsafe places. Due to climate change we also need to reduce use of oil.	This Multisale EIS tiers from the Five-Year Program EIS, which describes the baseline conditions due to climate change. Additional information has been provided in **Chapter 4.1** (Air Quality) of this Multisale EIS as well.
Cyrus Reed	CR-6	I do wonder if they have really analyzed -- you know, we have seen the climate change, we've seen -- not that there haven't been hurricanes always, but we've seen more intense hurricanes recently. So, I wonder if they have really examined the fact that if it's true that those storms are happening more often and becoming more intense, what that means for the infrastructure in the likelihood of spilling. I am not sure that they have analyzed that adequately. So, I would like them to do that.	**Chapter 3.2.1.1.1** (Trends in Reported Spill Volumes and Numbers) reports the total number and volume of oil spills reported to USCG from various sources, including barges, tanks, pipelines, and platforms. The analysis reported in Etkin (2009) not only reinforces the fact that hurricanes are the most common cause of spills from both platforms and pipelines but it also reports that structural failures (e.g., corrosion) also account for a significant percentage of the total volume of spilled oil from offshore pipelines. While it is possible that, as a result of climate change, both the number and severity of hurricanes may increase, the Bureau of Ocean Energy Management's OSRA estimates the risk of oil-spill contact to sensitive offshore and onshore environmental resources and socioeconomic features. Included in this analysis are trajectory simulations based on historical surface ocean currents and winds, which incorporate periods of hurricane conditions. In addition, BSEE provides a robust set of regulations relating to hurricane preparedness that help lower the risk of oil spills

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			occurring and that help prevent any loss of life.
Leon Soil and Water Conservation District Supervisory Board in Leon County, Florida, Brian Lee	LSWCDSB-1	And as such, my issues with the BOEM's EIS have to do largely with concepts that are going to potentially affect the ground water in Leon County, because continuing to develop and use fossil fuels is going to contribute to ocean acidification. When ocean acidification occurs, then salt water intrusion occurs through Florida's karst geology, which can then contaminate our actual drinking water supply in Florida.	BOEM has received many comments regarding the causal relationships between the combustion of fossil fuels, the increasing carbon dioxide (CO_2) concentrations in the atmosphere, and the resulting ocean acidification. These relationships are now well-established in the scientific community and are acknowledged by BOEM. The consequences and impacts of ocean acidification on marine organisms are not yet well understood, and this is now an active area of research. National priorities regarding ocean acidification were summarized in the recent National Research Council report, *Sea Change: 2015-2025 Decadal Survey of Ocean Sciences* (NRC, 2015). One area of concern is that ocean acidification may make it difficult for marine organisms to build hard calcium carbonate shells. The same process would be expected to slowly dissolve calcium carbonate formations. However, these theories have not yet been empirically demonstrated since changes in ocean acidification are measured in hundredths or thousandths of a standard pH unit. Groundwater in Leon County is derived from the Floridan Aquifer, a thick (up to 3,000 ft [914 m]) sequence of carbonate rocks, which encompasses the entire state of Florida and is one of the most productive aquifers in the world. Similar to other aquifers, the Floridan is currently affected by declining water levels and saltwater intrusion from overpumping and excessive water use. Salt water may enter the aquifer offshore where the Floridan Aquifer outcrops on the seafloor or it may originate from the Lower Floridan formation, which contains salt water. Additional information regarding the Floridan Aquifer can be found in the Floridan Aquifer System Groundwater Availability Study by USGS

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			(2016). Ocean acidification is not the cause of karst formations in Florida. Fresh water within the Floridan Aquifer is located at a higher elevation than sea level because fresh water floats on salt water. Therefore, it is not expected that ocean acidification exacerbates saltwater intrusion into the Floridan Aquifer.
Alabama Chapter of the Sierra Club, Carol Adams-Davis	ACSC-1	I would like to request a moratorium on new federal oil leases until the climate impacts of the federal oil leasing program are taken into account.	In the Five-Year Program EIS, BOEM compares greenhouse gas emissions from direct OCS emissions to those that could occur from energy substitutes that would presumably replace OCS production in the absence of a new OCS Program and comparable demand levels. Downstream greenhouse gases have been quantified. Please refer to the Five-Year Program EIS for additional information about how BOEM evaluates greenhouse gas emissions and climate change. This Multisale EIS tiers from the Five-Year Program EIS and has included additional information on greenhouse gas and downstream emissions information that may result from a Gulf of Mexico oil and gas lease sale in **Chapter 4.1**.
Jane McBride	JMB-2	Climate change is not a theoretical possibility in the future-it is happening now, and we must do all that we can to mitigate the disastrous consequences. Moreover, the United States should view climate change, not as a burden to our economy, but as an ECONOMIC OPPORTUNITY for the United States to regain its former position as a world leader in technology and innovation. No other country in the world is in denial about climate change science the way (half of) our country is, and the rest of the world is begging us to get serious about working with them to find solutions to prevent the worst scenarios from coming to fruition. Instead of drilling/fracking away at our limited oil and gas resources (which are finite	BOEM determined that an analysis of alternative uses is outside the scope of this Multisale EIS for a proposed action. The purpose and need identified in **Chapter 1** is to provide an analysis of the environmental impacts of oil and gas leasing. Per Section 18 of the OCSLA, BOEM is required to develop a schedule of oil and gas lease sales on the OCS for 5-year periods. Thus, the OCSLA is the implementing legislation driving the purpose, and it is the law requiring the Secretary of the Interior to propose an action. The proposed action under NEPA is the proposed lease sales identified in the Draft Proposed Program, and the Draft Multisale

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		anyway), we should be working to achieve energy independence through development of renewable, efficient, clean energy technologies that we can then SELL TO THE REST OF THE WORLD.	EIS determined possible environmental impacts of the proposed action in comparative form to other lease sale alternatives allowable under Section 18 of the OCSLA, including the No Action Alternative (i.e., no lease sale). The NEPA requires that agencies shall propose actions, and alternatives to that action, that meet the purpose and need. This means that decisions outside the scope of Section 18 of the OCSLA cannot be considered as reasonable alternatives (e.g., alternative uses of the ocean). Additionally, over the next 20 years, the U.S. Dept. of Energy's Energy Information Administration expects the U.S. to rely on more oil and natural gas to meet its energy demands, even as alternative sources of energy provide an increasing share of U.S. energy needs. Since the U.S. is expected to continue to rely on oil and natural gas to meet its energy needs, the proposed action would contribute to meeting that domestic demand. The OCS is a major long-term supplier of crude oil and natural gas, and the Gulf of Mexico OCS region has the greatest resource potential of the four OCS regions in the United States. Additional information pertaining to climate change and greenhouse gas emissions has been added to **Chapter 4.1**.
John Kersting	JK-3	If the estimated oil and gas reserves on the Outer Continental Shelf are extracted and burned, more than 60 billion tons of carbon dioxide emissions would be released, negating the positive efforts by the Obama administration to lower emissions from coal plants and vehicles.	Additional information regarding downstream emissions of greenhouse gases is included in **Chapter 4.1** (Air Quality).
Greenhouse Gas			
Steps Coalition, Jennifer	STEPS-3	By BOEM's own accounts the expansion will lead to 444 percent more greenhouse gas emissions than the level the U. S. committed to be -- committed to in order to prevent runaway climate change. Despite	BOEM recognizes the importance of climate change in its NEPA analyses and considers many facets of the potential effects of climate change in its decisionmaking with respect to oil and gas leasing,

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Crosslin, Community Organizer		this, however, BOEM concludes no threats to climate change and minimizes the impact the industry currently has on the people living on the coast, ignoring the environmental and health impacts and the threats to other important industries such as fishing and tourism, reporting only the benefit of an anticipated increase in offshore drilling jobs created by the expansion.	whether in the Five-Year Program or lease sale analyses. In the Five-Year Program EIS, BOEM compares greenhouse gas emissions from direct OCS emissions to those that could occur from energy substitutes that would presumably replace OCS production in the absence of a new OCS Program and comparable demand levels. Downstream greenhouse gases have been quantified. Please refer to the Five-Year Program EIS for additional information about how BOEM evaluates greenhouse gas emissions and climate change. BOEM expects that reducing OCS oil and gas consumption in the U.S. and the associated emissions from limiting OCS leasing would largely be offset by substitutes from other energy sources, either within the United States or elsewhere. BOEM has considered a no action alternative (i.e., cancellation of a proposed lease sale); however, that does not necessarily equate to zero downstream greenhouse gas emissions from oil and gas unless energy demand or supply changes drastically or cost-competitive clean energy sources are substituted. This Multisale EIS tiers from the Five-Year Program EIS and has included a summary of the greenhouse gas and downstream emissions information that may result from a Gulf of Mexico oil and gas lease sale in **Chapter 4.1**.
Sierra Club, Devorah Ancel, Staff Attorney	SC-8	BOEM Failed to Consider Downstream Greenhouse Gas Emissions: BOEM's Draft EIS fails to consider the greenhouse gas emissions that would be emitted by refining, transporting and burning the oil and gas to be extracted under its proposal. In evaluating the environmental impacts of the proposed action, NEPA requires BOEM to consider and describe the direct and indirect impacts. These impacts are distinct from one another. Direct effects are "caused by the action and occur at the same time and place." Indirect effects are caused by the action but, "are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems." Downstream greenhouse gas emissions are precisely the kind of indirect effects that BOEM must consider in analyzing the impacts of its leasing proposal. Indeed, guidance from the Council on Environmental Quality instructs agencies that "[e]missions from activities that have a reasonably close causal relationship to the federal action, such as those that may occur . . . as a consequence of the agency action (often referred to as downstream emissions) should be accounted for in the NEPA analysis." As it described, "[f]or example, a particular NEPA analysis for a proposed open pit mine could include the reasonably	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		foreseeable effects of various components of the mining process, such as . . . refining or processing the resource, and using the resource . . . as the direct and indirect effects of phases of a single proposed action." BOEM estimates that its proposal could result in the development and production of up to an estimated 9.5 billion barrels of oil equivalent. It is possible even more oil will be developed given BOEM's estimates that put all undiscovered technically recoverable resources in the Gulf of Mexico at 73 billion barrels of oil equivalent. Using EPA's carbon equivalent calculator, this means that BOEM's proposal could result in up to roughly 4.1 to 31.4 billion metric tons of greenhouse gas emissions from consumption of the oil. But BOEM wholly failed to consider the impacts of these emissions or how allowing offshore oil and gas leases in federal waters will impact our ability to limit warming below 2 degrees Celsius consistent with goals of and obligations under the Paris Agreement. There is only a finite amount of carbon dioxide ("CO2") that can be released into the atmosphere without rendering the goal of meeting the 1.5°C (or even a 2°C) target virtually impossible. Unleased OCS areas alone would consume between 11.6% and 13.8% of that global budget. Continued leasing of these fossil fuels is incompatible with any reasonable domestic and international path to limiting warming to 1.5°C or even 2°C. Conversely, keeping fossil fuels in the ground by ending new offshore leases will help limit warming by reducing greenhouse gas emissions. BOEM violates NEPA by ignoring the impacts of refining and consuming the oil and gas to be extracted under the proposal. This omission makes it impossible to know how BOEM's proposal can possibly be consistent with the Paris Agreement and efforts to limit warming to 1.5°C or even 2°C to avert the worst impacts of climate change.	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-5	Climate change, driven primarily by the combustion of fossil fuels, poses a severe and immediate threat to the health, welfare, ecosystems and economy of the United States and the world. In recognition of these threats, the Paris Agreement—adopted by 197 countries, including the United States—codifies the international, scientific consensus that climate change is an "*urgent and potentially irreversible threat to human societies and the planet* and thus requires the widest possible cooperation by all countries." The Agreement commits the signatories to hold global average temperature "to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels." This requires rapid and robust emissions reductions. Halting new oil and gas leases off our coasts would keep up to 62 billion tons of carbon emissions in the ground—the pollution equivalent of more than 16,000 coal-fired power plants. BOEM's proposal to lease over 70 million acres of the Gulf of Mexico so that oil and gas companies can drill up to 9.5 billion barrels of oil equivalent over the next 70 years will deepen the climate crisis and reverse course on President Obama's commitment to combat climate change. We urge you to halt all new oil and gas lease sales in federal waters, and keep these dirty fossil fuels in the ground.	
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-12	This EIS also fails to consider downstream greenhouse gas emissions. Downstream greenhouse gas emissions are precisely the kind of indirect effects that BOEM must consider in analyzing the impacts of its Proposal under NEPA. But BOEM's Draft EIS wholly fails to quantify the greenhouse gas emissions from burning the oil and gas to be extracted under its Proposal or consider the climate impacts of such emissions. In fact, much of this gas and oil will be refined directly in the Gulf	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Area. Moreover, because BOEM ignores these impacts, BOEM also fails to discuss how its Proposal can possibly be consistent with the Paris Agreement and efforts to limit warming to 1.5°C or even 2°C to avert the worst impacts of climate change. These failures violate NEPA. BOEM has failed to adequately assess both nitrogen oxide and volatile organic compounds and their role in ground-level ozone formation in gulf communities that result from the upstream, proposed drilling and downstream uses of the products that would emerge from the ocean floor. Nitrogen oxide and volatile organic compound emissions that cause ozone in areas like Houston, Galveston and Beaumont can not and should not be ignored in this draft multi-sale EIS. Specifically, the oil that would come out of the Gulf would most likely be refined in areas like Beaumont, Port Arthur, Harris County, Nueces County, as well as areas along the coast of Louisiana. To ignore these downstream impacts and downstream communities is a major failure of this EIS. BOEM has underestimated the amount of climate change gases and their environmental impacts on human and natural landscapes. Past, present and future foreseeable actions and their impacts should be analyzed and considered in an EIS. Thus, past emissions that have led to the present level of greenhouse gases from drilling and associated activities should be part of the EIS since they impact our present and future course.	
No New Leases Form Letter	NNL-3	The agency's refusal to consider or disclose impacts from consuming and burning the oil and gas extracted under its proposal is also morally and legally unjustifiable. BOEM cannot ignore the harmful climate effects of its proposal, or whether it's consistent with the Paris Agreement and efforts to limit global warming to 1.5 or 2 degrees Celsius.	
Cyrus Reed	CR-5	I'm not sure that this EIS really looks precisely at the	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		downstream impacts of oil and gas leasing and -- I mean that both for Greenhouse gas emissions, which I know is supposedly covered in the other EIS, but also for just other air emissions. So, if you drill oil and gas, you are going to have to either pipe it or ship it and it's probably coming here to Beaumont or Port Arthur or Louisiana to be refined and there are going to be impacts and those should be -- I guess my argument is: We shouldn't just look at the oil and gas drilling and its era impacts right there at the drill rig but also downstream, you know, where it's actually refined. So, I feel like that should be covered in this area.	
Katrina Dubytz	KD-2	And then we have reviewed the environmental impact statement, everyone on our team at Rethink, and it really fails to address the impacts of downstream greenhouse gas emissions in downstream communities. So, again, people in the local area who would be seriously affected by these issues are not getting the appropriate attention that they should be in this analysis.	
Well Stimulation			
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC),	CBD, BL, GRN, LBB, RAHC-9	BOEM Failed to Take a Hard Look at the Direct, Indirect and Cumulative Impacts from Offshore Fracking and Acidizing: BOEM acknowledges that oil companies use offshore fracking and other well stimulation treatments in the Gulf of Mexico. Offshore fracking and acidizing cause environmental damages beyond those of conventional offshore oil and gas development by producing water and air pollution, increasing the risk of earthquakes and oil spills, and prolonging the life of aging infrastructure and our use of dirty fossil fuels. But BOEM either wholly fails to address the impacts that could occur from these dangerous practices in its Draft EIS, or provides a woefully inadequate analysis. Water contamination is a significant risk of fracking because of the hundreds of chemicals used in fracking fluid.	Thank you for your comment. Language has been added to **Chapter 4.2** (Water Quality) to provide more detail on operational discharges and wastes, including those from hydraulic fracturing. To BOEM's knowledge, there have been no reported or documented seismic events linked to OCS well stimulation activities in the GOM. The onshore operations associated with the occurrence of increased seismic activity tend to use much higher volumes of water and proppants and create much more expansive fractures in the formation to stimulate the flow of natural gas or oil. The primary impact-producing factor of concern related to well stimulation activities in the Gulf of Mexico OCS would be discharges of well treatment, completion,

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Kristen Monsell, Staff Attorney		For example, a peer-reviewed study that examined fracking fluid products determined that more than 75% of the chemicals could affect the skin, eyes, and other sensory organs, and the respiratory and gastrointestinal systems; approximately 40 to 50% could affect the brain/nervous system, immune system, cardiovascular system, and the kidneys; 37% could affect the endocrine system; and 25% could cause cancer and mutations. In addition to posing a significant health and safety risk to humans, fracking chemicals can kill or harm a wide variety of marine life. Scientific research has indicated that 40% of the chemicals used in fracking can harm aquatic animals and other wildlife. Another recent study found that oil companies use dozens of extremely hazardous chemicals to acidize wells. Specifically, the study found that almost 200 different chemicals have been used and that at least 28 of these substances are F-graded hazardous chemicals—carcinogens, mutagens, reproductive toxins, developmental toxins, endocrine disruptors or high acute toxicity chemicals. Hydrofluoric acid, for example, is acutely toxic, and exposure to fumes or very short-term contact with its liquid form can cause severe burns. The study notes that acidizing chemicals can make up as much as 18 percent of the fluid used in these procedures. Further, each acidization can use as much as hundreds of thousands of pounds of some chemicals. This raises serious concerns as many of the hundreds of active offshore platforms in the Gulf discharge all or a portion of their produced water, including chemicals used in fracking and acidizing, into the ocean. While BOEM does not analyze the impacts of fracking wastewater discharges, it dismisses the import of produced water discharges generally because the discharge is regulated by Clean Water Act permits issued by EPA. But, as explained above, BOEM	and workover fluids, which are discussed in **Chapters 3.1.5.1, 3.1.3.1, and 4.2**. The potential effects of produced waters (including well treatment, completion, and workover fluids) on other resources, such as deepwater benthic communities (**Chapter 4.4.2**), live bottom habitats (**Chapter 4.6**), and protected species (**Chapter 4.9**), have also been analyzed and are expected to be negligible due to the assumed compliance with all permitting requirements and existing regulations. As indicated in the references provided, many of the risks identified are possible to mitigate with increased engineering controls. The BSEE's new Drilling Safety Rule significantly improves drilling safety by strengthening requirements. In 2012, BSEE published a final drilling safety rule and addressed some key recommendations made after the *Deepwater Horizon* explosion, oil spill, and response; however, in this final rule, BSEE closes gaps in existing requirements, addresses additional *Deepwater Horizon* recommendations, and updates BSEE's regulations to reflect industry's best practices. Operators must demonstrate that they are prepared to deal with the potential for a blowout and worst-case discharge, and permit applications for drilling projects must meet new standards for well-design, casing, and cementing, and be independently certified by a professional engineer. More information on the new applicable regulations and standards for both shallow-water and deepwater drilling operations can be found on BSEE's website at http://www.bsee.gov/About-BSEE/BSEE-History/Reforms/Reforms/.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		grossly underestimates the amount of produced water being discharged. Moreover, BOEM ignores the fact that the permit contains no real limit on the quantity of fracking or acidizing chemicals that can be discharged. Moreover, an agency cannot excuse itself from its NEPA hard look duty because a "facility operates pursuant to a. . . permit" or because the impacts have been discussed in a non-NEPA document. When not dumped directly into the ocean, wastewater from well stimulation is injected into the seafloor or transported onshore and injected there. This disposal method can result in leaks and contamination through the loss of well casing integrity. Studies have shown that 30% of offshore oil wells in the Gulf of Mexico experienced well casing damage in the first five years after drilling, and damage increased over time to 50% after 20 years. Well stimulation can increase the risk of well casing damage. For example, a recent scientific study found that older wells can become pathways for fluid migration, and that the high injection pressures used in fracking can "increase this risk significantly." For this same reason, fracking can also increase the risk of oil spills. This disposal method can also result in the contamination of drinking water. But BOEM ignores these impacts. In addition, new studies have drawn a strong connection between the recent rise in fracking wastewater injection and increased earthquake rates. For example, the USGS has recognized that wastewater disposal from fracking is a "contributing factor" to the six-fold increase in the number of earthquakes in Oklahoma. Another recent study also found that wastewater injection is responsible for the dramatic rise in the number of earthquakes in Colorado and New Mexico since 2001. Wastewater injection has been scientifically linked to earthquakes of magnitude three and greater in at least six states: Arkansas, Colorado, Ohio,	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Oklahoma, Texas, and New Mexico. And a recent study attributed wastewater injection from fracking operations to earthquakes in California. But it is not just wastewater injection that can lead to earthquakes. The practice of fracking itself has been found to contribute directly to seismic events. Even if the earthquakes that fracking directly generates are small, fracking could be contributing to increased stress in faults that leaves those faults more susceptible to otherwise naturally triggered earthquakes of a greater magnitude. BOEM's Draft EIS ignores these impacts as well. The failure to take a hard look at the impacts of offshore fracking and acidizing violates NEPA.	
United States Environmental Protection Agency	USEPA-3	The DEIS notes reliance on Boehm et al. (2001) for information relating to well stimulation activities in offshore drilling/production in the Gulf of Mexico (GOM). This study discusses the completion, stimulation, and workover chemicals that are used in the GOM. *See p.*3-64. The Boehm et al. (2001) study outlines a wide variety of chemicals used during the oil and gas extraction process. EPA notes that BOEM is proposing to update this study and has included a proposal to update the study in the 2015-2017 Study Development Plan. *Recommendation:* EPA recommends the inclusion of trend information pertaining to the volumes of well stimulation fluids used in well development, any available information on the formulation of these fluids, fate and transport, and other updated outcomes and issues relating to the Boehm study.	We thank USEPA for their interest in BOEM's proposed study to update the information in Boehm et al. (2001). BOEM invited a member of USEPA headquarters' staff to participate in the technical evaluation of the proposals and in the kickoff meeting for the newly awarded update and expansion of the study. Upon completion of the study, BOEM fully intends to include information from the study, as well as a reference to the new study, in our future NEPA documents.
John Young	JY-1	At least no new leases and/or permitting until the Bureau of Ocean Energy Management and Bureau of Safety and Environmental Enforcement fully reveal all the offshore drilling and fracking they've already	Cancelling all future lease sales and all activities under existing lease sales is not before the agency with this decision and is outside the scope of this Multisale EIS. To the extent that you are requesting

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		approved, comes clean about how they quietly approved such operations, and put fully funded and staffed and transparent rules and procedures in place to adequately monitor. shut down. remediate, and punish violations.	cancellation of this proposed lease sale, we acknowledge your preference for Alternative E. The BSEE's new Drilling Safety Rule significantly improves drilling safety by strengthening requirements. In 2012, BSEE published a final drilling safety rule and addressed some key recommendations made after the *Deepwater Horizon* explosion, oil spill, and response; however, in this final rule, BSEE closes gaps in existing requirements, addresses additional *Deepwater Horizon* recommendations, and updates BSEE's regulations to reflect industry's best practices. Operators must demonstrate that they are prepared to deal with the potential for a blowout and worst-case discharge, and permit applications for drilling projects must meet new standards for well-design, casing, and cementing, and be independently certified by a professional engineer. More information on the new applicable regulations and standards for both shallow-water and deepwater drilling operations can be found on BSEE's website at http://www.bsee.gov/About-BSEE/BSEE-History/Reforms/Reforms/.
Renewable Energy and Alternative Uses of the OCS			
Steps Coalition, Jennifer Crosslin, Community Organizer	STEPS-4	These jobs could easily also be created and likely in more numbers by expanding development in offshore wind, floating solar, tide and wave technology, and associated onshore development. We could, should, and absolutely have to break free from fossil fuels by stopping the expansion of the oil and gas industry and investing in renewables.	Thank you for your comment. The Secretary of the Interior oversees the OCS oil and gas program and is required to balance orderly resource development with protection of the human, marine, and coastal environments while simultaneously ensuring that the public receives an equitable return for these resources and that free-market competition is maintained. The decision on whether and how to proceed with each proposed lease sale is under the authority of the Assistant Secretary for Land and Minerals Management and will be disclosed in the Record of Decision following publication of this Final Multisale EIS.
Gulf Restoration Network, Howard Page	GRN-12	The Bureau of Energy Management needs to focus much more on locating offshore wind resources in the Gulf of Mexico. Economics should not be the only factor. Offshore wind is viable in the Gulf of Mexico. It needs to be part of a diverse energy mix, and it certainly needs to be part of a strategy to deal	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		with climate change.	
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-7	BOEM has failed to consider alternative uses of the ocean that would also support the economic development of the Gulf without the adverse impacts of oil and gas leasing. First, the significant role of tourism, fishing and other recreational uses of the ocean are undervalued and the impact that oil and gas drilling has on these other ocean uses are not adequately considered.	BOEM determined that an analysis of alternative uses is outside the scope of this Multisale EIS for a proposed action. The purpose and need identified for this Multisale EIS is to provide an analysis of the environmental impacts of oil and gas leasing. Per Section 18 of the OCSLA, BOEM is required to develop a schedule of oil and gas lease sales on the OCS for 5-year periods. Thus, the OCSLA is the implementing legislation driving the purpose, and it is the law requiring the Secretary of the Interior to propose an action. The proposed action under NEPA is the proposed lease sales identified in the Draft Proposed Program, and the Draft Multisale EIS determined possible environmental impacts of a proposed action in comparative form to other lease sale alternatives allowable under Section 18 of the OCSLA, including the No Action alternative (i.e., no lease sale). The NEPA requires that agencies shall propose actions, and alternatives to that action, that meet the purpose and need. This means that decisions outside the scope of Section 18 of the OCSLA cannot be considered as reasonable alternatives (e.g., alternative uses of the ocean).
Hilton Kelley	HK-6	There are a lot of negative things that are happening with all the oil drilling going on in the Gulf of Mexico and we think that we should get some reprieve from additional oil rigs being -- well, oil rigs out in the Gulf and the sale of the Gulf of Mexico. So, that is my statement. I am against oil drilling in the Gulf of Mexico and we need to look at renewable alternatives.	
Brenna Landis	BL-2	And really we need to be looking at responsibly transitioning. Not right away cutting it off, because that's unrealistic, but a responsible transition to renewable energy.	
Restore Mississippi Sound, Sharon Hayes, Director	RMS-7	Finally, the decision to adopt the preferred approach, which is to lease sale 10 sites for oil and gas development, seems illogical. It is based on the finding that alternatives to drilling would end up costing much more in terms of environmental and social costs. This is a result of the assumption that if the sites were not drilled, the alternatives would be additional imports with spills from transporting that oil and coal-fired and other electricity would need to be generated. These methods of providing energy are associated with a much higher costs than drilling for oil. The environmental costs also do not accrue to the Gulf. They accrue elsewhere. I also have a problem with the assumption that the energy mix that they assume for the alternative no-sale, no-drill options would stay the same. So no additional	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		reliance on renewables. They only -- they only assume 2 percent of energy consumption would come from renewables. However, renewable sources of energy consumption have grown almost 50 percent from 2006 to 2015. And that's from 6 percent to 10 percent of the energy con -- of energy consumed. And it's projected to be 15 percent in 2022.	
Bruce Melton	BM-1	There is an alternative missing. The concept is a carbon neutral fossil fuel extraction alternative. Direct air capture of carbon dioxide is $10 per ton using waste heat with Global Thermostat's new industrial scale pilot process. Captured C02 can be re-injected into fractured oil shale and sequestered in far greater quantities than previously assumed, while enhancing formation production (which will also need to be carbon neutral production as well creating a somewhat endless loop.) Tao and Clarens estimate the Marcellus Shale alone can hold 10 to 18 Gigatons of C02 through 2030, or half the C02 emissions from all US stationary sources during this period.	
Rebecca Parsons	RP-2	It is stunning that your intent is to promote the "same old" methods of energy production, when everything points to the disasters that will cause. Renewable energy innovation and production are proceeding at a fast rate - your efforts will be better spent in supporting and increasing renewables. Issue offshore wind farm leases instead. The dirty Industrial Age is over.	
Natural Stressors			
Restore Mississippi Sound, Sharon Hayes, Director	RMS-3	The potential impact of storms on oil discharges is not considered in the EIS as well is problematic since millions of gallons were spilled from pipes in the Gulf during Katrina and Rita, and almost 200 platforms were either destroyed or badly damaged.	While it is possible that, as a result of climate change, both the number and severity of hurricanes may increase, the Bureau of Ocean Energy Management's OSRA estimates the risk of oil-spill contact to sensitive offshore and onshore environmental resources and socioeconomic

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Apalachicola Riverkeeper	AR-2	In section 3.2, BOEM states that 47% of spills and accidents are due to hurricanes. Hurricanes are a prevalent and known reoccurring event in nature and as such should be planned for in a risk analysis. The statistic demonstrates that these incidents are not able to be planned for or that when the total cost of safe operations are considered, the analysis may not justify operations to recover the oil. At a minimum, hurricanes should be well planned for and those cost of planning and implementing prevention of such losses must be incorporated into costs for justifying and maintaining production. Design and construction of oil and gas facilities that provide a high level of certainty that failures due to hurricanes, such as the Taylor Energy leak, do not occur should be mandatory. Costs associated with a high level of certainty must be understood and planned for as part of implementation by the industry before permits and leases are considered.	features. Included in this analysis are trajectory simulations based on historical surface ocean currents and winds, which incorporate periods of hurricane conditions. In addition, BSEE provides a robust set of regulations relating to hurricane preparedness that help lower the risk of oil spills occurring and that help prevent any loss of life. The effects of hurricanes on coastal areas and oil and gas structures are discussed in **Chapters 3.1.6.1 and 3.2.1.1** and in the resource sections in **Chapter 4**. The effects of climate change and sea-level rise on coastal areas is discussed in **Chapters 3.3.2.8.1 and 3.3.2.10** and in the resource sections in **Chapter 4**. Additionally, **Chapter 3.2.1.1.1** (Trends in Reported Spill Volumes and Numbers) reports the total number and volume of oil spills reported to USCG from various sources, including barges, tanks, pipelines, and platforms. The analysis reported in Etkin (2009) not only reinforces the fact that hurricanes are the most common cause of spills from both platforms and pipelines but it also reports that structural failures (e.g., corrosion) also account for a significant percentage of the total volume of spilled oil from offshore pipelines.
Brenna Landis	BL-1	We also have a dead zone that we know of from runoff from farms all along the Mississippi River that comes into our Gulf of Mexico. So any oil spill would exacerbate the effect of that dead zone on our marine life and plant life in the Gulf.	The hypoxic zone in the Gulf of Mexico is described in **Chapter 3.3.2.12**. The resource chapters in **Chapter 4** considered this seasonal occurrence in the analysis of potential impacts. Please refer to **Chapters 4.2, 4.5, 4.6.1, 4.6.2, and 4.9.1**.
Air Quality			
American Petroleum Institute (API), Andy Radford	API-16	The DEIS air quality assessment suffers from a lack of specificity regarding the basis and criteria for establishing impact levels. The document does not include a tabulation of the emissions associated with the assessed lease sale scenario, or the corresponding lease block location. The document	As stated in **Chapter 2.1**, "this Multisale EIS addresses 10 proposed regionwide oil and gas lease sales encompassing all three planning areas in the U.S. portion of the Gulf of Mexico OCS." Since the OCSLA requires individual decisions to be made for each lease sale, "the analyses contained

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		also fails to clearly establish where air quality impacts should be assessed, in many cases describing impact locations as "over the OCS and adjacent onshore areas." A description of offshore impacts is irrelevant because the OCSLA limits the authority of the Department of the Interior to impacts that threaten onshore compliance with the National Ambient Air Quality Standards (NAAQS).	in this Multisale EIS examines impacts from a single regionwide proposed lease sale." Therefore, the air quality analysis and scenario data are not based on a single lease block location. As stated in **Chapter 2.4.1**, air emissions from OCS oil and gas development and non-OCS oil- and gas-related activities, as well as air emissions from associated activities that take place as a result of a proposed action, are discussed. Additionally, it is stated, "since the primary NAAQS are designed to protect human health, BOEM focuses the impact of these activities on the States, where there are permanent human populations." While the OCSLA may limit BOEM's ability to regulate certain activities or potential indirect impacts outside of BOEM's jurisdiction, NEPA requires Federal agencies to identify and analyze the potential direct, indirect, and cumulative impacts of a proposed action and its alternatives. Therefore, BOEM discusses the impacts to onshore air quality in this analysis. Any mistaken references to offshore impacts have been removed. As stated in **Chapter 4**, "the impact level conclusions reached in each resource area consider the applicable impact-producing factors, the level of activity, and geographic area of each alternative." BOEM lists the definition of the impact levels used and specifically mentions the data from the *Year 2011 Gulfwide Emissions Inventory Study* as the source for assessing the impact-producing factors (Wilson et al., 2014).
American Petroleum Institute (API), Andy Radford	API-17	Specificity is also lacking when BOEM uses non-qualifiers to describe what should be documented as qualitative or quantitative results. For example, terms such as "slight impact", "slight effect", and "very small" should be well defined to help clarify how	BOEM has revisited the air quality impact analysis, and all nonqualifiers have been replaced with qualitative or quantitative results as appropriate.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		these impacts contribute to the impact analysis. It is not clear how such qualifiers lead to determination of impact levels. API recommends that BOEM provide clarification in regards to what the terms represent and how these statements result in determination of a particular impact level: "The incremental contribution of a lease sale would have "slight impacts" on coastal nonattainment areas"; "The lease sales would have a "very small" impact on visibility impairment"	
American Petroleum Institute (API), Andy Radford	API-18	The lack of specificity seen in the DEIS is common among BOEM NEPA analyses, but it is not uniform. Three lease sale EISs – covering lease sales 225, 226, 235, 238, 241, 246, 247, and 248 – estimate onshore criteria pollutant concentrations by assigning representative emissions to a representative lease block. Because this DEIS serves in support of the Multisale and Lease Sale 249 (taking place in 2017), it is not clear why this level of detail is not presented. In fact, in several places the DEIS air quality assessment alludes to this type of detailed analysis being conducted but does not include the specific results (page 4-27, for example, claims that an estimated emission inventory was compiled but does not present it). However, for 1-hr nitrogen oxides (NOx), a specific result seems to be provided. On p. 4-27, the DEIS claims that the 1-hour nitrogen dioxide (NO2) standard has not been violated by any post-lease air quality modelling and, importantly, that the current regulations, reporting, and on-going monitoring will ensure that the NO2 NAAQS is not violated.	BOEM recently received an updated model with revised criteria pollutants and standards. This information and the results have been added to **Chapter 4.4** of this Final Multisale EIS. The air quality modeling results show that all averaging times for NO_2, SO_2, CO, and PM_{10}, and the 24-hour $PM_{2.5}$ are below the NAAQS. There was one monitoring site with annual $PM_{2.5}$ current year design value concentration above the NAAQS (in Harris County [Houston], Texas) but reduced to below the NAAQS in the future year. Additionally, as noted in Comment USEPA-9, BOEM has coordinated with USEPA prior to publication of this Final Multisale EIS to address additional comments. Also, specifically for USEPA-10, BOEM has begun a study to analyze the issue of fugitive emissions, the results of which could provide practical mitigations.
United States Environmental Protection Agency	USEPA-9	In Table 1 Alternative Comparison Matrix, air quality impacts are identified as minor for all four Alternatives. However, in Section 4.1.2 Environmental Consequences relating to Air Quality, the DEIS discussed the incomplete and unavailable information needed to assess the impacts from OCS	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		oil and gas-related activities. It also states that the air modeling study results that are necessary to determine if lease sale emissions adversely impact the State/seaward boundary or the shoreline are unavailable. Further, the DEIS identifies that a contract exists to obtain information and the results should be available in the future EIS documents. Thus, there is inadequate information to assess impacts to air quality. EPA's previous air quality impact comments on the BOEM lease sale EISs have focused generally on mitigation, greenhouse gas emissions, cumulative impacts, emissions above the significant impact level, and on the air quality offshore modeling analysis performed by BOEM. EPA notes that BOEM is updating the off-shore air quality inventory and impact modeling to substantiate its NEPA decisions and that modeling results will be available after the release of this DEIS. EPA plans to coordinate with BOEM on review of modeling results between the issuance periods of the DEIS and FEIS and will provide additional comments on air quality during the review of the FEIS.	
United States Environmental Protection Agency	USEPA-10	In Section 3.1.8.6 Greenhouse Gases, the DEIS dos not quantify GHG emissions and does not include a qualitative discussion of climate change impacts associated with the OCS and non-OCS oil- and gas-related operations and activities. On page 4-12, Table 4-1 identifies GHG impacts as minor for Alternatives A, B, C and D. On page 4-34, EPA notes that BOEM is updating air quality inventory and impact modeling to substantiate its NEPA decisions, and that modeling results will be available after the release of this DEIS. EPA plans to coordinate with BOEM on review of modeling results between the issuance periods of the DEIS and FEIS and will	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		provide additional comments on air quality during the review of the FEIS. *Recommendation:* EPA recommends the FEIS estimate the direct and indirect GHG emissions caused by the proposed project and its alternatives, including a discussion of the incremental impacts of the estimated GHGs and an analysis of reasonable alternatives and/or practicable mitigation measures to reduce project related GHG emissions. We recommend considering climate adaptation measures based on how future climate scenarios may impact the project in the FEIS. The National Climate Assessment (NCA), released by the U.S. Global Change Resource Program, contains scenarios for regions and sectors, including energy and transportation. Using NCA or other peer reviewed climate scenarios to inform alternatives analysis and possible changes to the proposal can improve resilience and preparedness for climate change.	
American Petroleum Institute (API), Andy Radford	API-19	In addition, the disparity between the conclusions of this document and the 5-Year Program DPEIS is confusing. This DEIS concludes air quality impacts are "minor", while the DPEIS concludes the air quality impacts of the 5-year program in the GOM will be "moderate". Our review shows similar analyses in both documents concerning potential impacts to onshore areas. That is, dispersion and mitigation have proven effective in reducing any threat (Wheeler 2008, DEIS at p. 4-27). This has been the consistent conclusion of multiple EIS's and modeling studies conducted by BOEM and its predecessors. API believes the DEIS analysis is correct based on the analysis presented. API recommends that BOEM	The Five-Year Program EIS is a national program EIS covering the Alaska, Pacific, and Gulf of Mexico regions. In that EIS, the analysis of impacts covers the entire proposed program for the given program area. For the Gulf of Mexico region that means the analysis covers the cumulative impacts of all 10 proposed regionwide lease sales. The impact analysis in this Multisale EIS covers a single proposed lease sale of the 10 proposed lease sales in the Five-Year Program EIS. Therefore, the scales of impacts can differ between the two documents. Additionally, BOEM has provided more detailed information and modeling results, and the text in **Chapter 4.1** has been revised.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		clarify in each document why the disparity exists and that the 5-year Program PEIS include a distinction of impact by region, in which case would reflect the Multisale DEIS conclusion of "minor" for the GOM.	
American Petroleum Institute (API), Andy Radford	API-20	Pages 4-20 and 4-21: The scales in Figures 4-3 through 4-6 are misleading. For a common pollutant, the binned scales for non-platform and platform sources are inconsistent.	Thank you for your comment. These figures have been removed and updated figures can be found in **Appendix H**.
American Petroleum Institute (API), Andy Radford	API-21	Page 4-25: "The OCS emissions... would resemble past emissions inventories and are indicated in Figures 4-9 and 4-10." – Figures 4-9 and 4-10 show Gulfwide emission figures, not emission figures for a single lease sale. API recommends that BOEM provide additional clarity by stating the figures of OCS cumulative emissions or make it clear that the distribution of emissions across various platform sources would be expected to be similar.	The Gulfwide Emissions Inventories include platform source emissions that are collected from operators and lessees with leases in the Gulf of Mexico OCS that are west of 87.5° W. latitude. **Figures 4-2 and 4-3** of the Final Multisale EIS represent emissions from the *Year 2011 Gulfwide Emissions Inventory* (Wilson et al., 2014). These emissions are not OCS cumulative emissions and, therefore, resemble past emission inventories.
American Petroleum Institute (API), Andy Radford	API-22	Page 4-25: "Platform and well emission were calculated using the integration of projected well and platform activities over time." – If this sentence describes the 2011 Gulfwide Emission Inventory, that should be stated.	The recommended change has been made to the text.
American Petroleum Institute (API), Andy Radford	API-23	Page 4-27: "Potential impacts resulting from all of the above routine activities based on Year 2008 and Year 2011 OCS emission inventories, post-lease 1-hour NOx modeling, and past studies are projected to be minor." Please provide reasoning for the "minor impact" determination and improve the clarity of this section.	Every tool (i.e., past studies, Year 2008 and Year 2011 emission inventories, and postlease 1-hour NO_x modeling) used to assess the impacts from routine activities found concentrations to be less than the maximum allowable increase or less than the NAAQS values, or found that a reduction in emissions had been achieved through mitigation. Based on those findings, the impact analysis for routine activities for this Multisale EIS demonstrates a minor impact (most impacts on the affected resource could be avoided with proper mitigation; if impacts occur, the affected resource would recover completely without mitigation once the impacting stressor is eliminated), as defined in **Chapter 4.1** of the Draft and Final Multisale EISs.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

<table>
<tr><th>Commenter</th><th>Comment ID</th><th>Comment</th><th>Response</th></tr>
<tr><td>Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director</td><td>LSCSC-16</td><td>BOEM has failed to adequately assess the impact of methane leaks from the upstream, proposed drilling and downstream use of these products, and its impact on both climate change and other public health impacts (such as ozone formation). At a minimum, if any drilling is ultimately authorized, BOEM must require robust VOC and methane leak detection and repair programs.</td><td rowspan="2">BOEM awarded a study, “Fugitive Emissions Update in the Outer Continental Shelf: Component Amounts and Counts,” to update fugitive emission factors, component counts, and stream compositions for both shallow-water and deepwater oil and gas facilities in the Gulf of Mexico OCS.

Updated fugitive emission factors for methane developed in this study will assist industry compliance with this greenhouse gas reporting requirement. Additionally, the Government Accountability Office (GAO) has published Opportunities Exist to Capture Vented and Flared Natural Gas, Which Would Increase Royalty Payments and Reduce Greenhouse Gases” (GAO-11-34) and is seeking to reduce methane losses by requiring the installation of control technology on platforms to simultaneously improve royalty revenue streams and reduce greenhouse gas emissions (U.S. Governmental Accountability Office, 2010). The updated information is not essential at this time because BOEM’s postlease plan approvals assess emissions and require air quality dispersion modeling to assess VOCs and GOADS reports to compare data to review for compliance by BSEE. As more information becomes available, BOEM and BSEE can impose mitigations.</td></tr>
<tr><td>Kim Ross</td><td>KR-2</td><td>So, you know, proposed leases can have an impact on methane leaks in the drilling, obviously. So methane leaks can lead to greater public health impacts and also can lead to greater marine life health impacts.</td></tr>
<tr><td>Cyrus Reed</td><td>CR-7</td><td>I kind of mentioned this before, but, yeah, I do want them to look at the -- in terms of air emissions, the nitrogen oxide and volatile organic compounds, because we do have an issue in Texas -- Houston, in particular -- but it's been a problem in Beaumont and Port Arthur, at least in the past, of ground level ozone in the summer. So, I want to make sure that any oil and gas leases we're doing aren't going to affect ozone because that affects kids and the elderly, in particular.</td><td>New information has been added to Chapter 4.1; this information includes the latest updated Gulfwide Emissions Inventory, modeling scenarios, and meteorological conditions. It also includes an analysis of the potential impacts of ozone across the Gulf of Mexico and coastal states.</td></tr>
</table>

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Kim Ross	KR-1	First from an air quality perspective the Environmental Impact Statement fails to adequately address nitrogen oxide and other volatile organic compounds that are found in ground level ozone formation which, and those would result from proposed leases so they fail to consider the harm that could potentially be impacted on both marine life and also the public health of Gulf communities.	
Renate Heurich	RH-4	Plus, we always have leakage. I've seen so many pictures of leaks in the Gulf from oil production. Gas is leaking all of the time, and methane is a very powerful greenhouse gas. It's, in the shorter term, 80 times more powerful than CO2, so we absolutely need to curb that.	BOEM is currently unaware of any issues related to the decommissioning of offshore wells, including plugging, sealing, and abandonment. A review of spill data reported to both USCG and BSEE provide no information showing that abandoned wells are currently leaking. This issue is independent from the leaking wells from the Taylor Energy platform that was lost during Hurricane Ivan and which is located in Mississippi Canyon Block 20. Additional information regarding this issue has been incorporated into this Final Multisale EIS. Please refer to the response to Comment LSCSC-16 for more information on fugitive emissions.
Kim Ross	KR-4	And then finally BOEM and BSEE insist that oil and gas activities are regulated in that there have been changes from since the Deep Water Horizon Macondo oil spill. Several federal studies do find that those changes are still lacking and so we need to make sure that there's actual changes before we go forward with any of these sales so I would recommend if possible to select I think it's Alternative E, which is to do nothing. To let's avoid lease sales and let's make these changes and reconsider in another, at another time and if not, then definitely these other issues around air quality and methane need to be taken into account.	A description of the air emissions' regulations and jurisdiction, and fugitive emissions can be found in **Chapter 3.1.8**. Please refer to **Chapter 4.1** for the impacts of a proposed action to air quality.
Coastal Habitats			
State of Louisiana	LADNR-2	Further, the DEIS fails to adequately quantify and assess secondary, indirect, and cumulative impacts	The text has been edited to revise the discussion and increase the estimate for the incremental

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Department of Natural Resources (LADNR), Don Haydel, Acting Administrator Interagency Affairs/Field		of OCS oil and gas activities to Louisiana's coastal resources. One example, which OCM has raised numerous times in commenting on earlier BOEM actions, is the effect of OCS supply vessels on channel widening. BOEM does make estimates of these potential land losses in several ways throughout the DEIS, which is a positive step. However, these estimates are done on a regional basis even though most of the impacts will be in Louisiana due to the state's central role in supporting the offshore oil and gas industry. BOEM then reaches the conclusion that the impacts are small enough to be ignored, even though the values of land loss are cumulatively significant: In the section on Navigation Channels, land loss under the Preferred Alternative is estimated to be 0.99 to 12.4 acres per year, Gulf-wide, based on OCS-related vessel traffic and average rates of channel widening. Over the 50-year span of development due to these lease sales, this amounts to 49.5 to 620 acres (DEIS Table 3-6, Pg. 3-49). Elsewhere, BOEM estimates that indirect impacts from wake erosion and saltwater intrusion will result in the loss of 831 acres per year, Gulf-wide, of which less than 2 percent is due to OCS-related traffic. 1 percent of 831 acres per year is 8.31 acres per year, which over 50 years totals 415.5 acres (DEIS pg. 4-59). Yet elsewhere, the Louisiana Comprehensive Master Plan is cited as projecting wetland losses in Louisiana at 1,750 square miles over the next 50 years. BOEM's estimate that OCS oil- and gas-related vessel traffic would contribute approximately one percent to this land loss over the next 70 years works out to 175 square miles, or 112,000 acres	impacts to wetlands from OCS oil- and gas-related activity as a result of a single proposed lease sale from negligible to minor to moderate. This is because BOEM agrees with Louisiana to the extent that the Draft Multisale EIS underestimated the incremental impacts because BOEM estimates that "land loss due to a proposed action range from 28 to 350 ha (~70 to 860 ac) over 70 years. Cumulative analyses are also included in order to put the incremental contribution of a proposed lease sale in context of the other types of activities (i.e., past, present, and reasonably foreseeable) that have the potential to cause impacts similar to those analyzed, including impacts from the overall OCS Program. Many of the impacts to environmental resources that are identified in the cumulative analysis of this Multisale EIS (and many previous NEPA documents) have occurred over many years, much of it prior to the enactment of important laws to protect the environment and prior to the bulk of OCS oil- and gas-related activities. BOEM has no authority to provide compensatory mitigation to the State of Louisiana in the same manner as an applicant for a Louisiana Coastal Use permit. BOEM is not an "applicant" for its OCS lease sale activity, as it does not propose specific Federal development projects in any States' coastal zone. While Federal law does not provide for compensatory mitigation in this case per se, the Government has provided funding through other means in recognition of these ongoing impacts. The Coastal Impact Assistance Program (CIAP) was established by The Energy Policy Act of 2005 (Public Law 109-58). The CIAP authorizes funds from OCS oil and gas revenues to be distributed to OCS oil- and gas-producing states for the conservation, protection, and preservation of coastal

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		(DEIS pg. 4-65). BOEM concludes that "Because of the small incremental increase in cumulative impacts to coastal wetlands associate with OCS oil- and gas-related vessel traffic … impacts are expected to be minor." (DEIS pg. 4-66), and " …only negligible impacts related to vessel traffic would result from the proposed action" (DEIS pg. 4-58) (emphasis in the original). However these estimates are calculated, these are NOT minor or negligible losses of wetlands. OCM, through its Coastal Use Permitting Program requires all Coastal Use Permit applicants to mitigate for wetland losses, even those losses that are less than 0.1 acre. The requirement to offset unavoidable cumulative losses is not dependent on the scale of the proposed activity; lost habitat value is lost habitat value. BOEM's characterization of these losses as minor or negligible is a continued abrogation of its responsibilities under the National Environmental Policy Act, Outer Continental Shelf Lands Act, Coastal Zone Management Act, Executive Orders, and the Department of the Interior's policies, all of which make clear that the Federal agency responsible for an activity is also responsible for mitigating for the direct, indirect, secondary and cumulative impacts. Further, these estimates are merely for the five-year program under consideration, and do not address the impacts to Louisiana of OCS lease sale activities dating back to 1954.	areas including wetlands. In recent years, Louisiana has received over $1 billion in offshore 8(g) revenues, over $0.5 billion dollars in CIAP funds, and stands to receive more offshore revenue shares in coming years from the Gulf of Mexico Energy Security Act of 2006 (Public Law 109-432). In answer to the specific comments from page 2 of your letter regarding the regional nature of BOEM's analyses, the Draft Multisale EIS chapter on coastal habitats devotes substantial discussion to Louisiana's coastal ecosystem and even acknowledges that Louisiana "currently accounts for about 90 percent of the total coastal wetland loss in the continental U.S." and that "Port Fourchon currently services approximately 90 percent of all deepwater rigs and platforms in the GOM." However, a proposed action involves proposed lease sales that affect the entire GOM, and thus regional estimates are appropriate. BOEM's responses to the bulleted items in your letter are below and are in the order of the bullets in your letter. 1. Agreed, based on Table 3-6 of the Draft Multisale EIS. 2. The Draft Multisale EIS says that a proposed action accounts for less than 2 percent of the total traffic (page 3-46). Half of the OCS traffic would be from Port Fourchon, which has an armored channel, thus reducing erosion rates (Kaiser, 2015). 3. Please note that 1 percent of 1,750 mi^2 is 17.5 mi^2, or 11,200 ac (4,532 ha). BOEM has revisited the impact conclusions for

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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<tr><td></td><td></td><td></td><td>vessel traffic. The text has been revised to increase the estimate of impacts of OCS oil- and gas-related activity to wetlands. BOEM has also updated its impact conclusion definitions.</td></tr>
<tr><td>Charles Mackey Clark</td><td>CMC-1</td><td>Two Blocks of Central Planning Area (CPA) closest to Horn Island are <u>quite</u> close to that barrier island – 2 miles or so. For this pristine island, that represents an environmental and aesthetic threat.</td><td rowspan="2">Thank you for your comment. Federal OCS waters begin 3 nmi (3.5 mi; 5.6 km) off the coast of Mississippi. BOEM analyzed the potential visual impacts of OCS oil- and gas-related activities on Horn and Petit Bois Islands in Chapter 4.12. BOEM acknowledges that OCS structures could negatively impact the viewshed near these islands. However, BOEM has determined that these impacts would be negligible to minor because of the locations and types of structures that are forecasted to arise from the alternatives. In addition, BOEM has issued an ITL regarding the subsequent review processes that will occur prior to any activities on leases within the first 12 mi (19 km) of Federal waters near the Gulf Islands National Seashore.</td></tr>
<tr><td>Gulf Coast Group of the Mississippi Sierra Club, Steve Shepard, Chair</td><td>GCGMSC-2</td><td>I am very upset to be living through the Shell Oil spill. It's one spill on top of another. We should stop that. And in a more specific way, just looking at your Central Planning Area, I object to the fact that Mississippi has open for leasing waters all the way essentially to the barrier islands. I know it's probably three miles outside the barrier islands. But there is a push to establish drilling rigs close to Mississippi waters and also to Mobile Bay. I think we should do the same thing that Baldwin County has, which is a moratorium near shore.</td></tr>
<tr><td>Hilton Kelley</td><td>HK-2</td><td>We have some concerns about land erosion due to oil coming into the wetlands, killing the vegetation, and also helping to erode the land due to the lack of vegetation holding up the land together. There's a serious erosion in sea-level rise in the wetlands as well.</td><td>Thank you for your comment. Please refer to Chapter 4.3.1 for the analysis of oil and gas development impacts on wetlands.</td></tr>
<tr><td>Hilton Kelley</td><td>HK-4</td><td>And, also, we want to reclaim our beaches. I remember as a kid growing up here in Southeast Texas walking on McFaddin Beach and one time I stepped in this soft spot and it was just all gooey and all of a sudden, my leg just went all the way down in it up to the knee and it was nothing but tar and the sand had somewhat covered it over. I never went back to that beach and our beaches have, basically, been -- particularly McFaddin Beach -- have been destroyed because of the tar balls that wash up almost annually.</td><td>Thank you for your comment. Please refer to Chapter 4.3.2 for the analysis of oil and gas development impacts on coastal barrier beaches and associated dunes.</td></tr>
</table>

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
United States Environmental Protection Agency	USEPA-5	On pages 4-81 and 4-82 under the Vessel Traffic and Dredging Section, the DEIS identifies the waves generated by boats, ships, barges, and other vessels erode unprotected shorelines and accelerate erosion in coastal barrier beaches already affected by natural erosion processes. Also, it states that the existing armored navigation channels minimize or eliminate the potential for shoreline erosion from vessel traffic. The DEIS identifies the impact of erosion of coastal barrier beaches and associated dunes from vessel traffic to be negligible, and maintenance dredging to be minor. *Recommendation:* EPA recommends the FEIS provide specifics on existing navigation channels which are armored and not armored in order to fully evaluate impacts from vessel traffic and dredging.	This Final Multisale EIS has been revised to state that impacts to coastal barrier beaches and dunes from dredging would be minor (revised from negligible); however, the vessel traffic itself would not cause much beach erosion because <2 percent of the vessel traffic is related to a proposed action and because many of the passes (where navigation channels cross the beaches) used for the OCS are armored. BOEM used an estimate from Thatcher et al. (2011) that 30 percent of the channels were armored. That study, funded by BOEMRE (BOEM's predecessor), examined the extent of armoring and the type of substrate along the lengths of 17 navigation canals in the GOM.
United States Environmental Protection Agency	USEPA-8	In Section 4.3.1.2 Disposal of OCS-Related Wastes, Trash, and Debris and Section 4.3.2.2 Environmental Consequences, the DEIS states that "BOEM and BSEE have addressed the marine debris issue by imposing marine debris awareness and prevention measures on the oil and gas industry through NTL 2015-BSEE-GOE, which provides guidance to the industry operators regarding dumping trash and debris into the marine environment and informs operators of regulations set by other regulatory agencies (i.e., the USEPA and USCG). Because of the mitigations and awareness, OCS oil- and gas-related trash and debris from a proposed action would result in negligible impacts to estuarine habitat." In the absence of data to substantiate the	BOEM acknowledges the fact that debris from OCS oil- and gas-related activities contributes to the debris found on coastal beaches. For example, the Draft Multisale EIS states that the offshore oil and gas industry was shown to contribute 13 percent of the debris found at the Padre Island National Seashore (Miller et al., 1995). However, this debris does not alter beach profiles, species composition and abundance, or ecological function beyond a minor extent.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		effectiveness of these measures, it is unclear how the basis of negligible impact was determined. The impacts of trash and debris on aquatic ecosystems, particularly with regard to micro-plastics are being studied more intensely, and plastic is now found throughout the world's oceans. *Recommendation:* EPA recommends analyzing trend data on oil and gas-related debris washing up on beaches to support the qualitative evaluation. Amounts of vessel and platform litter released to the ocean were estimated as far back as at least thirty years ago by such organizations as the National Academy of Sciences, the Marine Mammal Commission, NOAA and others. More recent studies and beach debris catalogs are available for comparison and trend analysis.	
Biologically Sensitive Areas			
Cyrus Reed	CR-4	I do recognize that Alternative D seems to open up the potential to protect the areas with topographic special features. I am not a, you know, biologist. So, I am going off memory here. But topographic, I guess, high features in the ocean floor. And, so, I would absolutely -- if oil and gas drilling is going to be done, all of those areas -- and you know I've got a list of them that I copied from the East Flower Garden Bank, West Flower Garden Bank, Horseshoe Bank. There's, you know, 30 or so of them, and I won't read them all, but, yeah, I do believe, at the very least, should be protected because we know from the BP Deep Horizon Disaster, you know, what can happen when there are oil and gas released and how that can impact these places. So, keeping drilling out of those areas would be very important.	Thank you for your comment. We note that your preferred alternative is Alternative D. The Secretary of the Interior oversees the OCS oil and gas program and is required to balance orderly resource development with protection of the human, marine, and coastal environments while simultaneously ensuring that the public receives an equitable return for these resources and that free-market competition is maintained. The decision on whether and how to proceed with each proposed lease sale is under the authority of the Assistant Secretary for Land and Minerals Management and will be disclosed in the Record of Decision following publication of this Final Multisale EIS. Additionally, under all of the alternatives, BOEM has determined that these areas would be protected through application of the Topographic Features Stipulation and the Live Bottom (Pinnacle Trend) Stipulation for

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			each proposed lease sale.
Apalachicola Riverkeeper	AR-4	BOEM considers the Gulf of Mexico as a Class II, moderately productive ecosystem, but then states that the long term productivity is stressed. The assumptions do not provide a scenario that will improve the short or long term productivity back to or closer to its natural level of productivity. The Gulf of Mexico Restoration Council has established programs and projects to improve the Gulf of Mexico back toward its more natural productivity. It is not logical to consider vast numbers of additional acres for oil and gas leases knowing the risk of impacts are high; both short- and long-term when this action is in conflict with the Council's objective. A consistent assessment of goals should be undertaken.	The purpose of this Multisale EIS under NEPA is to disclose the impacts of oil and gas leasing on the physical, biological, and human environment. This way, the Assistant Secretary for Land and Minerals Management can make an informed decision on whether and how to hold a lease sale. Through our cumulative impacts analysis, BOEM has identified multiple stressors in the GOM, many of which are outside of BOEM's jurisdiction. Therefore, it is outside the scope of this Multisale EIS to return the GOM back to its natural levels of productivity. Throughout our analysis, BOEM has provided protections wherever possible to protect sensitive habitats and resources as we fulfill our mission to "manage the mineral resources located on the Nation's Outer Continental Shelf in an environmentally sound and safe manner." The Gulf of Mexico Restoration Council is a separate entity with a separate mission from that of BOEM. However, BOEM is committed to working with all stakeholders in the GOM region to ensure that stressors under BOEM's jurisdiction are mitigated if possible, with the goal that the GOM remains a productive ecosystem.
Fish and Invertebrates			
American Petroleum Institute (API), Andy Radford	API-24	It is at times difficult to link conclusions with the information presented in the DEIS. This is in part due to information that is presumably found in associated documents. While this is intended to facilitate brevity, it makes it difficult to identify the studies supporting findings. For instance, the potential impacts of a very large accidental release on Gulf resources are assessed in a separate document, Essential Fish Habitat Assessment for the Gulf of Mexico. However, it is unclear how the analysis from that white paper informed the DEIS. Furthermore, the lack of a clear linkage between the	The information in **Chapter 3.1.5.1.6** (Cooling Water) incorrectly indicated that **Chapter 4.7** would provide more detail on the entrainment of eggs and larvae. **Chapter 3.1.5.1.6** has been revised to remove this reference and clarify that a negligible impact is expected. The potential magnitude of impact for each of the identified impact-producing factors is provided in a summary table at the beginning of each resource section in **Chapter 4** to help the reader quickly identify the level of potential impacts. The impact-

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		conclusion and supporting evidence makes it difficult to follow the identification of an issue and the impact determination of the respective issue. For instance, entrainment of fish eggs and larvae is identified as an issue early on, but is later identified as not an important issue. Moderate impacts to fish and invertebrates are associated with cumulative impacts. However, the moderate cumulative impacts due to sound and fisheries are based on an unknown amount of future impact due to activities unrelated to the OCS lease block that could range from negligible to moderate (i.e., population level impacts but which are not long-term). Given that this conclusion is extremely broad and is based on unknowns, API recommends that BOEM prepare a summary table and impact scores should better reflect the level of uncertainty and a predicted contribution from the OCS activities.	level definitions and the analyses supporting these conclusions are discussed therein. The table summarizing cumulative impacts distinguishes between OCS oil- and gas-related activities and non-OCS oil- and gas-related activities to mirror the discussion of these topics. Although many factors affect the levels of shipping, commercial fishing, recreational fishing, and other activities that generate impact-producing factors, it is not necessary to predict activity levels in order to reasonably assume that these activities would continue to occur and generate impact-producing factors. The analysis includes reasonably foreseeable aggregated activities and associated impact-producing factors, but it does not attempt to address the multiple individual aspects of the many human activities occurring in the marine environment, which would be speculative and would not benefit the overall analysis.
American Petroleum Institute (API), Andy Radford	API-25	Page 4-185: Four impact producing factors were examined, including anthropogenic sound, bottom disturbing activity, habitat modification and oil spills. Notable exceptions were that magnitude of the potential impacts from all sounds combined (i.e., vessel traffic, exploratory drilling, geophysical activities, and offshore construction) would be minor for the Alternatives considered. Not included were produced water discharges and impingement and entrainment (from cooling water intake structures on the facility). The DEIS states impingement and entrainment were not considered based on limited exposure and/or response expected. The analysis showing that these factors are a limited exposure is not presented, even though two papers that support the analysis were mentioned on page 3-66 (i.e., LGL Ecological Research Associates Inc., 2009 and LGL Ecological Research Associates Inc., 20014), and	**Chapter 3.1.5.6** has been revised to clarify the potential extent of impingement and entrainment, and a discussion of effluents has been included in the analysis in **Chapter 4.2.2.1** (Water Quality, "Routine Activities").

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		the reader is referred to Chapter 4-7 for "[m]ore information on the specifics regarding potential impacts to fisheries…". Effluents and potential constituents of some effluents and the potential impacts from cumulative discharges over the 50 year lease period should be discussed to substantiate their omission.	
American Petroleum Institute (API), Andy Radford	API-26	Section 4-7 (p 4-184) - Why are surface waters only considered for icthyoplankton? On p. 4-187 only one life history category is considered (icththyoplankton). Concentration areas for fish eggs and larvae are described, particularly locations influenced by the Mississippi River. If these concentration points are widely distributed throughout the lease areas, this should be specified as Section 4.7.2 on p. 4-191 and 4.7.2.1 on page 4-202 indicate that the analysis assumes a non-random, even distribution of fish and invertebrates; otherwise the potential impacts to concentrations of eggs and larvae in portions of the Gulf should be discussed for each Alternative. API suggests that BOEM provide clarification as to why surface waters were only considered in the context of oil and gas impacts and non-oil and gas impacts.	**Chapter 4.7** has been revised to clarify that surface waters were considered with respect to coastal pelagics, epipelagics, and ichthyoplankton. Additional explanation of hydrographic features was included to **Chapter 4.7** to clarify how and where eggs and larvae may become concentrated relative to other surface waters in the Gulf of Mexico. **Chapter 4.7** states that distribution is generally associated with particular water column or other habitat characteristics. However, fishes and invertebrates are assumed to be broadly distributed within the range of preferred habitat particular to a species.
American Petroleum Institute (API), Andy Radford	API-27	Page 4-200: For impacts due to OCS activities, the DEIS relies on the resource agencies to limit potential impacts from commercial and recreational fisheries. However, for cumulative impacts, the DEIS indicates that moderate impacts might be expected for areas/species that are overfished. The DEIS should be consistent in the role of resource agencies. In addition, the expression of impacts as moderate should clearly state that this is due to non-OCS impacts. Furthermore the offset from habitat/fish biomass that is provided by the presence of OCS structures in the Gulf should be mentioned.	BOEM does not have the authority to manage fish populations in the GOM; therefore, we rely on and work with other Federal agencies to maintain healthy populations of fishes in the GOM. For more detail, please refer to the discussion in the "Non-OCS Oil- and Gas-Related Activities" section. BOEM appreciates the observation that cumulative fisheries impacts result from activities other than OCS oil- and gas-related activities. Including the impact-producing factors' explanation and analysis in the "Non-OCS Oil- and Gas-Related Activities" section should sufficiently highlight the fact that these fishing impacts are not due to OCS oil- and gas-related activities.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			With respect to infrastructure as habitat, no "offset" is associated with OCS oil- and gas-related infrastructure. Although the distribution of species has been associated with some infrastructure, the comment appears to attribute a production-specific benefit, which has been theorized. Although BOEM acknowledges the use of these temporary structures as habitat by several species of fishes and invertebrates, BOEM also recognizes that the structures must be decommissioned and removed during the 50-year analysis period. Furthermore, any specific habitat benefit has not been determined, and stock assessments have not identified any biomass increases associated with OCS oil- and gas-related infrastructure; for BOEM to do so would be speculation.
American Petroleum Institute (API), Andy Radford	API-28	Pages 4-201 and 202: States that there could be moderate impacts due to unknowns only if the "impact-producing factor affects habitat or populations to an extent that would be expected to exceed natural variation in population abundance or distribution but not result in a long-term decline." This is the definition of moderate impacts. This should be caveated with the probability that OCS lease options would contribute to that potential moderate impact (e.g,. although the contribution of OCS lease activities are predicted to be negligible to minor).	The definition was prepared with respect to potential impacts to fishes and invertebrates and not only as a consequence of OCS oil- and gas-related activity. Therefore, the probability that a specific level of impact could be caused by specific activities is not relevant.
Birds and Protected Birds			
American Petroleum Institute (API), Andy Radford	API-29	As with the previous sections, it is difficult to link conclusions with underlying data. This is in part due to information that is presumably found in associated documents. API recommends that BOEM considers using a table as described at the beginning of this section to more clearly link conclusions with the data. Moderate to major impacts for birds are associated with cumulative impacts. However, the higher impact	Thank you for your comment. The information referenced on page 4-218 of the Draft Multisale EIS was incorrect and BOEM has corrected it in the Final Multisale EIS. The comment is not correct about the derivation of the higher impact (major) on page 4-220 of the Draft Multisale EIS. The text there states, "The incremental cumulative impacts of a proposed action to non-OCS oil- and gas-related

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		rating is primarily due to non-OCS factors such as West Nile virus, predation by cats, and wetland subsidence (Page 4-220), whereas the potential impacts from the Deepwater Horizon, non-OCS oil and gas related factors and the minimization of OCS oil and gas-related impacts through lease stipulations and regulations were considered to be negligible (Page 4-218). Given that this conclusion is extremely broad and is based primarily on non-OCS related oil and gas activity impacts, the summary table and impact scores should better reflect the level of uncertainty and a predicted contribution (or lack thereof) from the OCS activities.	anthropogenic events and natural processes are considered major, but only because of the impact of non-native diseases." The text in the Final Multisale EIS has been clarified, but the impact levels for cumulative OCS oil- and gas-related impact-producing factors in **Table 4-11** are correct, as are the impact levels for non-OCS oil and gas-related impact-producing factors.
American Petroleum Institute (API), Andy Radford	API-30	Page 4-306 "Impacts to protected species were deemed negligible to moderate if a protected bird species changes it normal migratory behavior due to artificial lighting". API recommends that BOEM provide more scientific justification and references to better explain this moderate rating should be better explained or suggest that BOEM down-rate to minor.	Thank you for your comment. Please refer to the impact criteria as defined in **Chapter 4.9** (Protected Species). Moderate impacts are expected if acute behavioral changes occur due to an anthropogenic stimulus, including artificial lighting. Nocturnal circulating events can have negative impacts to the health of migratory birds (refer to **Chapter 4.8** [Birds] for more details). Of the protected bird species considered, the piping plover and red knot would be the most likely impacted by artificial lighting on OCS structures due to their migratory behavior and offshore foraging.
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-11	The EIS does look at potential impacts on important species like turtles and migratory birds. However, the impacts are severely understated, particularly with regards to the impacts of major spills.	BOEM has determined that the analysis in this Multisale EIS is centered on the best available and credible scientific information. BOEM's subject-matter experts are experts in their fields and conducted extensive scientific and literature reviews to ensure their analyses and impact conclusions are fully supported by the best available and credible scientific information. BOEM's subject-matter experts have clarified in this Multisale EIS where incomplete or unavailable information may be essential to a reasoned choice among alternatives, if the information could be obtained or, if the costs of obtaining it are exorbitant, and that what

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			scientifically credible information is available was applied using accepted scientific methodologies. BOEM's analysis of oil-spill risk, which is detailed in **Chapter 3.2.1**, includes detailed discussions of offshore spills <1,000 bbl and ≥1,000 bbl, and coastal spills. As described in **Chapter 3.2.1.4.2** (Trajectory Modeling for Offshore Spills ≥1,000 bbl), the Bureau of Ocean Energy Management's OSRA model simulates the trajectory of thousands of spills throughout the Gulf of Mexico OCS and calculates the probability of these spills being transported and contacting specified geographic areas and features. Using these assumptions, BOEM's subject-matter experts then evaluated the potential impacts to the resource, including birds and sea turtles. While there are always some judgment calls that must be made when developing forecasts for a scenario and the potential resulting impacts, BOEM believes this is a reasonable approach and that it would tend to be conservative in probably overestimating impacts rather than underestimating them. Each alternative single lease sale scenario is based on (1) recent trends in the amount and location of leasing, exploration, and development activity; (2) estimates of undiscovered, unleased, economically recoverable oil and gas resources in each water-depth category and each planning area; (3) existing offshore and onshore oil and/or gas infrastructure; (4) published data and information; (5) industry information; and (6) oil and gas technologies and the economic considerations and environmental constraints of these technologies. Due to the inherent uncertainties associated with an assessment of undiscovered resources, probabilistic techniques were employed to develop the reasonably foreseeable postlease activities

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			scenario, and the results are reported as a range of values corresponding to probabilities of occurrence. BOEM used the aforementioned categories to develop a low-activity scenario and a high-activity scenario. The activity level associated with a proposed lease sale is expected to vary based on a number of factors, including the price of oil, resource potential, cost of development, and resource availability (e.g., drill rig availability). BOEM feels the developed ranges provide a reasonable expectation of oil and gas production and associated activity anticipated from a single proposed lease sale.
Marine Mammals			
American Petroleum Institute (API), Andy Radford	API-31	The Impact Producing Factors section (Section 3.1.2.1 p. 3-10) provides a reasonable, but brief, summary of geological and geophysical (G&G) operations with references to the Atlantic G&G PEIS and a GoM G&G PEIS currently being developed. Although an exhaustive review of G&G activities may not be necessary, it would be appropriate from BOEM to provide a greater level of detail in this EIS, especially descriptions that are relevant to recent survey activities in the GoM. More importantly, the text in this DEIS only describes the activities themselves and does not review available information on the mechanisms of potential impacts to relevant species. Such information for marine mammals is not present in this section nor is it present in the Impact Analysis section (4.9.1.2). A more detailed review and analysis of potential impacts from G&G activities resulting from lease sales are warranted, even if such analyses are, or will be, available in other NEPA documents. API recommends that BOEM consider adding this level of detail before the Multisale EIS is finalized in June 2017 and before the Lease Sale 249.	BOEM appreciates the substantive content of this comment and has revisited the summary of G&G operations in **Chapter 4.9.1** (Marine Mammals). This chapter has been revised to further clarify the potential impacts to marine mammal species that may result from G&G activities and the information that is currently available. Further, an explanation of why BOEM would include the *Atlantic OCS Proposed Geological and Geophysical Activities: Mid-Atlantic and South Atlantic Planning Areas, Final Programmatic Environmental Impact Statement* by reference has been provided. Also, in regards to Comment API-38, BOEM has revised **Chapter 4.9.1.2** to clarify that the referenced technical paper, "National Standards for a Protected Species Observer Program" (Baker et al., 2013) is not a regulatory document. Additional language has also been added throughout this chapter to consider the new information from a recent proposal to list the GOM Bryde's whale as endangered in this analysis.
American	API-38	Section 4.9.1.2 (p. 4-241) The section describing	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Petroleum Institute (API), Andy Radford		potential impacts from G&G Activities is extremely brief. Several primary literature sources are referenced, but there is little to no summary of them. There is no real analysis of the mechanism of impact from G&G survey sounds or justification for why those impacts would results in negligible to moderate impacts. As BOEM has stated in public documents (i.e. August 2014 BOEM Science Note), "there is no documented scientific evidence of noise from air guns used in G&G seismic activities adversely affecting marine mammal populations or coastal communities." References to additional information available in other NEPA documents are insufficient justification especially when that other document was prepared for Atlantic OCS planning areas. Also, this section references a technical paper "National Standards for a Protected Species Observer Program" (Baker et al. 2013) as if it has the force of regulation. This is not true as implementation of those standards in the form of regulations has not yet occurred. API recommends that BOEM make this clarification in the Final EIS and continues to document potential impacts, or lack thereof, in the final Multisale EIS and future GOM NEPA documents.	Other revisions to the text can be found throughout **Chapter 4.9.1.2**.
American Petroleum Institute (API), Andy Radford	API-32	The marine mammal population estimates provided in Table 4-14 are appropriately taken from the NMFS Stock Assessment Reports (Waring et al. 2014). Recently released habitat-based density and population estimates (Roberts et al. 2016) are not included in the table or in the following text describing individual species. Excluding them from the table is appropriate, although some discussion of those estimates would be appropriate to add to the text of the following section, especially for consistency with other BOEM NEPA and MMPA related documents currently in production or review. Along with the population estimates, the Potential	BOEM appreciates the substantive content of this comment and has revisited **Chapter 4.9.1** (Marine Mammals). This chapter has been revised to further clarify the use of NMFS' Stock Assessment Reports (Waring et al., 2014) and potential biological removal (PBR) estimates to help determine how a proposed activity may impact a marine mammal stock. Further, this chapter has provided the impact-producing factors that are evaluated when calculating the PBR estimate of a marine mammal stock (including annual human-caused mortality and serious injury) and the role that PBR estimates may play in the management of marine mammal stocks.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Biological Removal (PBR) estimates are provided and the calculation of PBR is described in the text. However, the PBR estimates are not referred to later in this section and it is unclear what the purpose of their inclusion is. The use of PBR for an effects analysis from offshore oil and gas activities is inconsistent with the purpose for which PBR is calculated (assessing impacts of mortalities from incidental fisheries takes). API recommends that BOEM clarify what the purpose is for including PBR estimates, as well as an explanation and justification for why NMFS Stock Assessment Reports were used versus habitat-based density and population estimates.	Because the mentioned study by Roberts et al. (2016) on habitat-based density and population estimates of marine mammals in the Gulf of Mexico has recently been finalized, BOEM has added some discussion of this study in its analysis of marine mammals in **Chapter 4.9.1.1**.
American Petroleum Institute (API), Andy Radford	API-33	The resultant expected impacts are described as ranges for marine mammals. For example, the expected impacts from transportation range from negligible to major. It is unclear why different subsections use different examples. Based on the examples provided, the impact level determination appears to be based primarily on the population estimate of the species concerned. However, using the three impacts above, it is unclear why two are ranked as Negligible to Major, whereas the other is ranked as Negligible to Moderate (Table 4-13, p. 4-227). There is insufficient justification for the upper level limit of Major for "Marine Trash and Debris" and "Transportation (vessel strikes)" impacts, while the upper level limit is moderate for "Decommissioning (explosive severance)" impacts. Any impact-producing factor that could result in serious injury or mortality could be classified as either major or moderate depending on the species involved. In the subsection on decommissioning (p. 4-246), the EIS further states: "Therefore, depending on the population estimate of any given species, explosive severance methods could have a major impact." So it is unclear why this factor was	BOEM appreciates the substantive content of this comment and has revisited the requested impact determinations in **Chapter 4.9.1** (Marine Mammals). Impact determinations have been given further clarification. Furthermore, the supporting protected species chapter (**Chapter 4.9**) has been revisited to clarify how impact-producing factors may affect a protected species differently, depending on its population size. Revisions to **Chapter 4.9** (Protected Species) will apply to all protected species described in this Multisale EIS.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		given an upper limit impact level of moderate. The difference cannot be accounted for by mitigation because all three of these activities have regulated mitigations. Are the respective mitigations for vessel strikes (i.e., NTL 2012-JOINT-G01, Vessel Strike Avoidance and Injured/Dead Protected Species Reporting) and marine trash and debris (i.e., NTL 2012-BSEE-G01, Marine Trash and Debris Awareness and Elimination) less effective than those for decommissioning (i.e., NTL 2010-BSEE-G05, Decommissioning Guidance for Wells and Platforms)? In all three cases, the EIS suggests that with mitigation "the reasonably foreseeable" impact would be Negligible. API recommends that BOEM consider our recommendations regarding clarification of certain aspects of the cumulative impacts analysis and "impact-producing factors".	
American Petroleum Institute (API), Andy Radford	API-34	Thorough descriptions of the two ESA listed species (Sperm whale and West Indian manatee) are provided, but descriptions of the remaining 19 species of marine mammals are grouped by taxonomic family and are very limited. At this high taxonomic level, only the most basic feeding habits and distributional information is provided. No information about what is known about current impacts from oil and gas activities in the GOM is presented, nor are the descriptions adequate to evaluate the likelihood of activities on future leases causing additional impacts. The subsequent text in this section does not provide any actual analysis of potential impacts to specific species and such information is not presented in the Impact Producing Factors section (3.1) either. While politically and practically convenient, using the U.S EEZ limits to define the southern extent of the NGOM (in terms of how populations and ranges are managed) is not functionally appropriate. Most of the species either travel to, or rely on seasonal resources from, other	BOEM appreciates the substantive content of this comment and has revisited **Chapter 4.9.1** (Marine Mammals). This chapter has been revised to clarify the limited amount of spatial information available for wide-ranging oceanic marine mammal stocks in the Gulf of Mexico region (including south of the U.S. Exclusive Economic Zone limits) and how the most credible peer-reviewed science was used to evaluate potential impacts from past, present, and reasonably foreseeable OCS energy-related activities to these marine mammal stocks. Additional language has also been added throughout **Chapter 4.9.1** to consider the new information from a recent proposal to list the GOM Bryde's whale as endangered in this analysis.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		parts of the GOM.	
American Petroleum Institute (API), Andy Radford	API-35	When comparing potential impacts from the Alternatives, the first paragraph states that "While the WPA is a smaller area with less projected activity than is proposed for the CPA/EPA (refer to Chapter 3), marine mammal species are widely distributed throughout the planning areas. As such, activities isolated to specific planning areas pose similar potential impacts to populations as do activities occurring in all planning areas. Therefore, because of the diversity and wide distribution of species in the Area of Interest, the level of impacts would be the same for Alternatives A, B, C, and D". Even though marine mammal species are widely distributed and often highly mobile (especially deep-water species), because Alternatives B and C would exclude very large areas of the GOM from leasing it is hard to justify that potential impacts from those alternatives would be just as great as under Alternatives A or D. It seems only logical that impacts may be reduced if new leasing-related activities were not to occur over such large areas. This same argument is present in the first paragraph of section 4.9.1.2.1 on page 4-265. API recommends that BOEM specifically provide further justification to support this conclusion and if the evidence exists to make the distinction between Alternatives. As stated in previous comments, API also recommends that BOEM provide additional clarity and explanations in more comprehensive form that shows potential impacts to all species in the GOM to provide clear linkages between findings and determination of impacts (individual and cumulative).	BOEM appreciates the substantive content of this comment and has revisited the alternatives discussion in **Chapter 4.9.1** (Marine Mammals). Further clarification and justification has been added to explain how an impact-producing factor may potentially affect a marine mammal stock regardless of the geographic location of where the potential impact-producing factor may occur.
American Petroleum Institute (API), Andy Radford	API-36	Section 4.9.1.1 – This section provides very specific examples of the different individual impact levels to marine mammals when discussing the various impact-producing factors. These are noted below by species. What is not clear is how these individual	Thank you for your comment. BOEM has revised **Chapter 4.9.1.1** to clarify and reference all information used for impact determinations and refers the reader to **Chapter 4.9** (Protected Species) for further clarification on how population

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		levels and factors are weighed in the level determinations and there is often not clear data or references provided to support the likelihood of such impacts occurring the GOM.	estimates are analyzed when making these determinations.
American Petroleum Institute (API), Andy Radford	API-37	Table 4-14 (p. 4-229) – The table provides the "best available" population estimates for marine mammal species in the northern Gulf of Mexico. The source of these estimates is NMFS stock assessment reports (Waring et al. 2014). However, NMFS has stated the agency's acceptance of the use of Roberts et al. (2016) habitat-based cetacean density models as the more recent and best estimates of population. Conflicting datasets could result in differences in agencies' metrics (e.g., take estimates, PBR, etc.). Furthermore, discrepancies in the ranges of different population metrics could inadvertently inflate a qualitative impact level analysis if BOEM is considering a particular metric that may or may not be calculated using a different population estimate (e.g. Roberts et al. versus Waring et al.). The agencies' need to agree on estimates of populations and stocks in order to adequately assess impact levels and factors that will lead to aligned decision-making and are mutually supported by the best available science.	BOEM appreciates the substantive content of this comment and has revisited **Chapter 4.9.1.1**. Because the mentioned study by Roberts et al. (2016) on habitat-based density and population estimates of marine mammals in the Gulf of Mexico has recently been finalized, BOEM has added some discussion of this study in its analysis of marine mammals in **Chapter 4.9.1.1**. Although BOEM analyzes the potential impacts of OCS oil- and gas-related and non-OCS oil- and gas-related activities associated with a proposed lease sale and a proposed lease sale's incremental contribution to the cumulative impacts to marine mammals, NMFS is responsible for managing marine mammal stocks in waters under U.S. jurisdiction under the MMPA.
American Petroleum Institute (API), Andy Radford	API-39	Section 4.9.1.2 (p. 4-241) – "Marine mammals can become entangled in some types pf lines associated with G&G (Geological and Geophysical) activities." References are needed.	Thank you for your comment. BOEM has revisited **Chapter 4.9.1.2** to clarify all information leading to impact determinations and has cited supporting literature.
American Petroleum Institute (API), Andy Radford	API-40	Section 4.9.1.2 (p. 4-241) – Transportation – The analysis of impact from Transportation, primarily the potential impacts from vessel strikes, includes very little GOM specific vessel-strike information except in the case of manatees and possibly sperm whale. The text references NTL 2012-JOINT-G01 which requires operators to report observations of injured or dead protected species. API recommends that BOEM summarize the results from these reports so	Thank you for your recommendation. There are no reports of vessel strikes to marine mammals or sea turtles since the NTL was written. Therefore, there are no trends that would change the conclusions found in this Multisale EIS.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		the current level of impact from O&G activities could be understood and the relative impacts from future years placed into context.	
American Petroleum Institute (API), Andy Radford	API-41	Section 4.9.1.2 (p.4-241) Transportation cont. – The last two sentences of the first paragraph, which are: "Nowacek and Wells (2001) found that bottlenose dolphins had longer interbreath intervals during boat approaches compared with control periods (no boats present within 100 m [328 ft]) in a study conducted in Sarasota Bay, Florida. They also found that dolphins' decreased interanimal distance, changed heading, and increased swimming speed significantly more often in response to an approaching vessel than during control periods." These are very specific statements that appear only peripherally related to the topic at hand. The implication seems to be that ship presence can cause behavioral reactions, but BOEM does not state this explicitly or explain why those statements are made. API recommends that BOEM clarify why these statements are included.	BOEM appreciates the substantive content of this comment and has revisited **Chapter 4.9.1.2** to further clarify the results of the referenced study and its relevance to impact determinations.
American Petroleum Institute (API), Andy Radford	API-42	Section 4.9.1 (p. 4-246) - "For example, if a group of pantropical spotted dolphins (population estimate of 50,880 individuals) were not detected prior to a detonation and experienced physical injuries or mortalities, it would have a localized and irreversible impact on that group of individuals, but it would not diminish the continued viability of the population." BOEM needs to explicitly state what a group size is to support the conclusion stated. Again, this relates back to the mixed use of population estimates between agencies and the more important determination is the ratio between group and population that indicates the impact (or no impact) to the population.	BOEM appreciates the substantive content of this comment and has revisited the hypothetical example used in the "Decommissioning" section of **Chapter 4.9.1.2**. The hypothetical group of pantropical spotted dolphins was explicitly defined with a hypothetical number of individuals, and the relevance of this hypothetical example to impact determinations was clarified. Please refer to the response for Comment API-37 concerning the mixed use of population estimates between agencies.
American Petroleum Institute (API), Andy Radford	API-43	Section 4.9.1 (p. 4-229 Table 4-14) – West Indian Manatee (Population Estimate - 6063, PBR – Undetermined). How was this NGOM population estimate of 6,063 derived – does it include animals	Thank you for your comment. BOEM has revisited **Table 4-14** in **Chapter 4.9.1** and has added the source of the West Indian manatee population estimate and has described the spatial and temporal

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		that live on the East coast of Florida? It is not clear in this document. API recommends that BOEM include in-text references to clarify the sources for the estimates.	bounds of this estimate.
American Petroleum Institute (API), Andy Radford	API-44	Section 4.9.1 (p. 4-236) – Description of Sirenia. For practical purposes, this species should be divided into the two sub-species; Florida manatee and Antillean manatee. The cooler NGOM winters are considered a barrier contributing to the genetic isolation between these two populations (USFWS).	BOEM appreciates this comment and has revisited **Chapter 4.9.1**. This chapter has been revised to distinguish the two subspecies of West Indian manatee and their spatial distribution.
American Petroleum Institute (API), Andy Radford	API-45	Section 4.9.1.1 (p. 4-231)– "The NMFS considers sperm whales in the GOM as a distinct stock in the Marine Mammal Stock Assessment Report (Waring et al. 2014), and research supports this distinction from the Atlantic and Caribbean stocks…" The NGOM sperm whale population is not an isolated genetic stock. While not a common occurrence, there is some evidence that adult male NGOM sperm whales travel seasonally through the Florida straits into the NW Atlantic Ocean. One adult male travelled to the North Atlantic and then back into the Gulf after about two months. From Engelhaupt et al. (2009) in NOAA 2012, it states that "[a]nalysis of biparentally inherited nuclear DNA showed no significant difference between whales sampled in the Gulf and those from the other areas of the North Atlantic, indicating that mature males move in and out of the Gulf." It is also documented that the spatial distribution of GOM sperm whales is correlated with mesoscale oceanic physical circulation features (Biggs et al. 2005). Features include Loop Current and its eddies, which can locally increase primary production and prey availability. While the Loop Current exhibits long-term circulation trend, it also exhibits significant yearly interannual seasonal variability in the number of eddies shed (Chang and Oey, 2012 and Hall, 2012) and the movement and persistence of those eddies moving westward across	BOEM appreciates the substantive content of this comment and has revisited **Chapter 4.9.1.1**. This chapter has been revised to clarify why NMFS considers sperm whales in the Gulf of Mexico a distinct stock and the movement of sperm whales in regards to the impact-range levels and potential impacts that broad movement might have, or lack thereof, on determining impacts from OCS oil- and gas-related and non-OCS oil- and gas-related activities, including, but not limited to, ship strikes (documented by NOAA's Office of Protected Resources species' website [Waring et al., 2016]) and physical oceanographic circulation features. While the specific references cited in this comment may not have been used in this analysis, BOEM has considered that hydrographic features (e.g., the Loop Current and eddies) may impact movement patterns of sperm whales inhabiting Gulf of Mexico waters in its analysis. "Seasonal aerial surveys confirmed that sperm whales sightings are more common during summer (Mullin et al., 1991 and 1994a; Mullin and Hoggard, 2000; Mullin and Fulling, 2004), but this may be an artifact of movement patterns of sperm whales associated with reproductive behavior, hydrographic features, or other environmental or seasonal factors."

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		the central to western GOM OCS and shelf (Sturges and Leben, 2000). Loop Current and its eddies are a natural mechanism that could naturally change sperm whale distribution, which is not included as an additional non-oil and gas factor. API recommends that BOEM consider the movement of sperm whales in the final GOM Multisale EIS and document movement in regards to the impact range levels and potential impacts that broad movement might have, or lack thereof, on determining impacts from oil and gas and non-oil and gas factors, including, but not limited to, ship strikes (documented by NOAA Office of Protected Resources species webpage) and physical oceanographic circulation features.	BOEM has also considered that site fidelity, as well as habitat use, differs among male and female sperm whales in its analysis. "Females and juveniles form pods that are found mainly at tropical and temperate latitudes (between 50°N. and 50°S. latitude), while the solitary adult males can be found at higher latitudes (between 75°N. and 75°S. latitude) (Reeves and Whitehead, 1997)." "Sperm whales are present year-round in the GOM, with females generally having significant site fidelity and with males and females exhibiting significant differences in habitat usage (Jochens et al., 2008)."
American Petroleum Institute (API), Andy Radford	API-46	Section 4.9.1.2 (p. 4-242) – Vessel Strikes are mentioned multiple times throughout this document as a source for human-activity related mortality. Aside from manatee collisions with vessels in coastal regions, are marine mammal-vessel interactions an issue for the offshore NGOM regions? Collisions with vessels are a main cause of North Atlantic right whale mortality but North Atlantic right whales are not considered as a NGOM species in this report. As previously mentioned in regards to sperm whales, API recommends that BOEM include citations from known ship strike mortality of cetaceans in the GOM.	BOEM appreciates the substantive content of this comment and has revisited **Chapter 4.9.1.2**. The chapter has been revised to include information related to vessel strikes of marine mammals in the Gulf of Mexico.
Sea Turtles			
American Petroleum Institute (API), Andy Radford	API-47	Section 4.9.2.1 (p. 4-268) – "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 1000-m isobaths" and Section 4.9.2.1 Page 4-269 – "Subadult and adult loggerheads are primarily coastal…" These two statements appear to be in disagreement. Is it the very young turtles that are sighted over the OCS and beyond? What is the definition of "coastal" here? API recommends that BOEM include a definition of "coastal" in the context	Thank you for your comment. The first sentence refers to loggerhead sea turtles in general. The second sentence refers to the subadult and adult age classes. The habitat for juvenile turtles is described as follows: "Developmental habitat for small juveniles is in the open ocean. Offshore, they reside for months in the oceanic zone in *Sargassum* floats, generally along the Loop Current and the west coast of Florida."

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		to the discussion noted here. We further suggest that the definition of "coastal" be written in the context of water depth and region designations throughout the Multisale EIS and DPEIS to maintain consistency in terminology.	
American Petroleum Institute (API), Andy Radford	API-48	Section 4.9.2.1 p. 4-271) – "In the GOM, juvenile/subadult Kemp's Ridleys occupy shallow, coastal regions." API recommends that BOEM include references to this statement.	Thank you for your comment. This reference is included in the previous paragraph: "Ogren (1989) suggests that the Gulf Coast, from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult Kemp's ridleys in the northern GOM. Juvenile/subadult Kemp's ridleys have been found along the Eastern Seaboard of the U.S. (Epperly et al., 2007) and in the GOM." Changes have been made to the text to clarify the language and references.
American Petroleum Institute (API), Andy Radford	API-49	Section 4.9.2.1 (p. 4-272) – "Green sea turtle mating occurs in the waters off the nesting beaches. Each female deposits 1-7 clutches (usually 2-3) during the breeding season at 12- to 14-day intervals. Mean clutch size is highly variable among populations but averages about 110 eggs." Is the above information attributed to Balazs 1983? If so, API recommends that BOEM it needs to be properly cited in the text and clarify exactly what the reference, if not from Balazs 1983 refers to. The Balazs reference represents life history data for the Hawaiian Islands Region – not the NGOM. Further, Balazs 1983 is dated and does not represent current conditions.	Thank you for your comment. This Final Multisale EIS has been updated to include referenced material for the Gulf of Mexico from Hart et al. (2013).
American Petroleum Institute (API), Andy Radford	API-50	It would be better for BOEM to refer to Hart et al 2013 for green turtles in the Dry Tortugas (Southern GOM), which states that, "The nesting season for green sea turtles lasts throughout the summer but is most concentrated in June and July. During nesting season, females nest at roughly 2-week intervals, producing an average of five nests or "clutches." Each clutch contains an average of 135 eggs, which will hatch after incubating for about 2 months	Thank you for your comment. Hart et al. (2013) has been included in this Final Multisale EIS regarding green sea turtles in the Gulf of Mexico as it contains current and relevant information since the Dry Tortugas is considered to be in the northern Gulf of Mexico.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
American Petroleum Institute (API), Andy Radford	API-51	Section 4.9.2.1 (p. 4-276) – "Schwartz (1988) reported numerous loggerhead hatchling during commercial trawling for Sargassum in the Atlantic." Are there any NGOM relevant references for this distribution? Or does this imply that the same green turtle hatchlings found offshore in the Atlantic Ocean are also found at later stages in the NGOM – this is important to know and API recommends that BOEM make this clear in the final EIS.	Thank you for your comment. The referenced study was used to show the association of turtles with *Sargassum*. Please refer to the following sentence as stated in the Multisale EIS: "Witherington et al. (2012) conducted a study on juvenile turtle use of *Sargassum* habitats and further supported that these drifting communities are important areas for young sea turtles (84% of 1,884 turtles were observed within 1 m [3 ft] of floating *Sargassum*)." This reference is related to a study conducted along the eastern and Gulf Coasts of Florida, and it further shows the link between sea turtles and floating *Sargassum*.
American Petroleum Institute (API), Andy Radford	API-52	Section 4.9.2.2 (p. 4-278) – "Stranding data for the U.S. Gulf and Atlantic Coasts, Puerto Rico, and the U.S Virgin Islands show that, between 1986 and 1993, about 9 percent of living and dead stranded sea turtles had boat strike injuries (Lutcavage et al. 1997). Given the limitations of the baseline ecological data, it is important to discern the differing levels of threats in the difference environments – API recommends that BOEM review NGOM-only records and better clarify the potential non-oil and gas impacts that could be threats to sea turtles.	Thank you for your comment. BOEM only used the Gulf of Mexico information from the stranding data. The non-OCS oil- and gas-related impacts are discussed in the "Description of the Affected Environment" chapter for each species and in the "Non-OCS Oil- and Gas-Related Impacts" section in the "Cumulative Impacts" chapter for sea turtles (i.e., **Chapter 4.9.2**).
American Petroleum Institute (API), Andy Radford	API-53	Section 4.9.2.2 (p. 4-279) –Transportation - "Given the scope, timing, and transitory nature of a proposed action and with this established mitigation, the impacts to sea turtles from vessel collisions are expected to be negligible; however, if the collisions occur, impacts could be moderate." This statement is confusing. API recommends that BOEM clarify by answering the following questions:, How many collisions would constitute a moderate impact? A moderate impact to which species? Moderate in terms of the damage to a particular animal or population? – The DEIS describes the expected low risk of vessel-turtle collision and a history of no recorded vessel-turtle collisions in the GOM; but the	Thank you for your comment. The impact criteria are defined in **Chapter 4.9** (Protected Species). The impact from vessel collisions are expected to be negligible since vessel collisions are not likely to occur due to established mitigation. The impact would be moderate if any sea turtle sustains impact from a vessel collision due to the endangered or threatened status of each species of sea turtles in the GOM.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		degree of risk is lost in the impact analysis.	
		Infrastructure	
United States Environmental Protection Agency	USEPA-6	On page 3-4, the DEIS states pipeline capacities are unknown. On pages 3-38 and 3-42, it identifies a mature pipeline network exists in the GOM to transport oil and gas production from the OCS to shore, and projects that the majority of new pipelines would connect to the existing pipeline infrastructure. Additionally, on page 3-35, the DEIS projects that the number of pipeline removals or relocations would increase region-wide as the existing pipeline infrastructure ages. EPA recommends the EIS incorporate specifics on the age, condition, and likely need to replace or rebuild these existing pipelines due to the increased activity from the proposed action and the assessment of negligible impact.	Please refer to **Chapter 3.1.3.3.1** for more information on pipelines and **Chapter 3.1.6.1** for information on pipeline age. The typical life span of a pipeline has been estimated to be 20-40 years, but with current preventative measures, including using corrosion resistant or corrosion-inert materials, that lifetime has been substantially increased. Pipeline routes are inspected at time intervals and methods prescribed by BSEE's Regional Supervisor of Field Operations. When pipelines are protected by rectifiers or anodes for which the initial cathodic protection system either cannot be calculated or calculations indicate a life expectancy of less than 20 years, the pipelines are inspected annually (30 CFR § 250.1005(b)). As platforms and sections of pipelines are decommissioned, additional pipeline may be installed to reroute transport to shore. Occasionally, pipeline segments may require replacement, especially on risers near the surface where corrosion potential is the highest. As new platforms are built on new leases, pipelines are forecasted to be built to attach these new production structures to the existing matrix of pipelines. While the current capacity of pipelines can be calculated, the future capacity cannot be forecasted as it will depend on the size and location of the reservoirs discovered. If the current matrix of pipelines has the capacity to transport oil from new leases, BOEM expects industry would choose to tie into the existing matrix.
United States Environmental Protection Agency	USEPA-12	The DEIS discusses the proposed action's OCS and non-OCS oil- and gas-related construction and operations. *Recommendation:*	Environmental issues associated with offshore oil and gas operations in Federal waters are governed by BSEE's regulations at 30 CFR § 250.107; Safety and Environmental Management Systems' (SEMS) regulations at 30 CFR § 250.1910; and the NPDES at 40 CFR part 122. Offshore oil and gas

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		EPA recommends the FEIS identify projected solid and hazardous waste types and volumes, and expected storage, disposal, and management plans, and appropriate mitigation to minimize the generation of hazardous waste (i.e., hazardous waste minimization).	operations are specifically excluded from regulation under the Resource Conservation and Recovery Act (USEPA, Office of Solid Waste, 2002). Generally, however, oil and gas wastes are not considered hazardous. Produced water, the largest waste stream from offshore oil and gas operations, may be discharged to the ocean in accordance with USEPA Regions 4 and 6 NPDES permits. Spent chemicals used in well treatment, completion, and workover (WTCW) fluids may be commingled and discharged with produced water. Therefore, these waste streams are discharged to the ocean, and a management plan or waste minimization is not required as would be performed under the Resource Conservation and Recovery Act. Solid wastes such as trash/debris, used oil, washwater, and other chemical product wastes are taken to shore for disposal or recycling. Onshore disposal/recycling of these wastes are usually included in the EP and DOCD in Table 2: Waste and Surplus Estimated to be Transported and/or Disposed of Onshore." Please refer to the second link at http://www.boem.gov/Water-Quality-Spreadsheets/. Waste going to shore is not considered hazardous; therefore, the material is transported under a Bill of Lading. Additionally, NTL 2015-BSEE-G03, "Marine Trash and Debris Awareness and Elimination," presents BSEE's policy regarding marine debris prevention. "The discharge of garbage and debris has been the subject of strict laws, such as MARPOL-Annex V and the Marine Debris Act, 33 U.S.C. 1951 *et seq.*, and regulations imposed by various agencies

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			including the United States Coast Guard and the Environmental Protection Agency. Since oil and gas operations in the Gulf of Mexico may contribute to this problem, 30 CFR 250.300(a) and (b)(6) prohibit you from discharging containers and other materials into the marine environment, and 30 CFR 250.300(c) and (d) require you to make durable identification markings on skid-mounted equipment, portable containers, spools or reels, and drums, and to record and report such items when lost overboard to the District Manager through facility daily operations reports." Please refer to **Chapter 3.1.5** for more information.
United States Environmental Protection Agency	USEPA-14	In Table 1 Alternative Comparison Matrix, land use and coastal infrastructure impacts are identified as major for all Alternatives. In Section 3.1.7 Coastal Infrastructure, the DEIS describes the potential need for new facility construction and for expansions at existing facilities, and transportation services involving both onshore and offshore activities. On page 4-378 and 4-379, it discusses that railways and major interstates are critical to the success of service bases and port facilities. It is unclear the extent and magnitude of transportation and traffic impacts. *Recommendation:* EPA recommends the FEIS clarify transportation and traffic impacts and identify any committed mitigation.	**Table 1** in the **Executive Summary** and **Table 2-2** (Alternative Comparison Matrix) has been updated to more clearly convey the expected incremental contribution from a proposed action to the overall cumulative effects to land use and coastal infrastructure. Lease sales would serve mostly to maintain ongoing activity levels associated with the 2012-2017 Five-Year Program. Industry would more or less maintain its current usage of infrastructure. Only after several cancelled lease sales (or where there is limited leasing) would we expect to see a noticeable difference in activities. Additional references and clarifying language has been added to **Chapter 4** to better address transportation and traffic impacts. However, BOEM does not have the authority to require mitigations for onshore transportation. That would fall under the U.S. Department of Transportation and the State-level Departments of Transportation.
Socioeconomics			
State of Louisiana	LADNR-1	Though there has been some gradual improvement over the years in the attention paid to Louisiana's	Thank you for your comment. BOEM continually attempts to improve its model predictions, and

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Department of Natural Resources (LADNR), Don Haydel, Acting Administrator Interagency Affairs/Field		concerns, this DEIS again falls short in that there is inadequate effort made to confirm that model predictions used in the environmental and socioeconomic analyses, are reliable indicators of actual outcomes.	comparing historical predictions to realized outcomes is an important method for doing so. BOEM's model predictions generally consist of (1) scenarios for oil and gas exploration, development, and production and (2) predictions of outcomes (such as economic variables and oil spills) that are based on those scenarios. Both of these components attempt to incorporate analyses of the historical accuracy of predictions, although BOEM will examine whether improvements can be made. However, there are limits to this approach given the limits of the available data and the fact that the oil and gas industry continually evolves.
OffshoreAlabama.com, Steve Russell	OAL-1	Opening up new areas for exploration will create hundreds of local jobs at a time when Mobile County's unemployment rate is 7.0 % (March 2016). Continuing with this process of not delaying, restricting or prohibiting the 2017-2022 Gulf of Mexico lease sales will have 2 major benefits for Mobile County: First, expend capital investment and capital investment means more county and state sales and property taxes and school taxes on equipment and machinery; Secondly, put hundreds of local people to work boosting household incomes: we know through surveys that the average annual wage for oil & gas workers in Mobile County exceeds $60,000, significantly higher than the $42,097 (October 2015, ADOL) average annual earnings in Mobile County. Higher paying jobs means more taxes and it also means that their families spend more money in the community on all kind of goods and services, benefiting even more people and putting money in their pockets. Finalizing a multisale EIS that allows Gulf lease sales to proceed without any further exclusions or restrictions is important to sustaining the health of the Mobile economy.	Thank you for your comment. BOEM appreciates the detailed information in your comment and acknowledges the importance of the direct, indirect, and induced impacts of OCS oil- and gas-related activities on the coastal economies. Additional emphasis language has been added to the social factors chapter to underline this importance to coastal communities. BOEM analyzes the beneficial economic impacts of the alternatives in **Chapter 4.14.2**.
Consumer Energy	CEA-1	Make no mistake; the Gulf of Mexico is an energy powerhouse for Texas, the Gulf Coast region, and	Thank you for your comment. BOEM presents data regarding the beneficial impacts of the alternatives

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Alliance (CEA), Brent Greenfield		the entire country, supplying nearly 20% of the nation's crude oil. It is also an economic powerhouse. In FY 2014 alone, Gulf of Mexico oil and gas activity supported 651,000 jobs, generated over $64 billion in Gross Domestic Product and provided over $7 billion in revenue to the federal government.	in **Chapter 4.14.2**.
Consumer Energy Alliance (CEA), Brent Greenfield	CEA-2	Contrary to assertions by a small but vocal group of anti-energy groups, we can protect our environment AND meet our energy needs. As but one example, CEA notes the draft EIS recognition of this reality in its conclusion that Gulf lease sale activity would include beneficial impacts for commercial and recreational fishing and recreational resources.	Thank you for your comment.
Cyrus Reed	CR-3	I recognize that the EIS does talk about the role of tourism, fishing, and other recreational uses of the ocean, but I am not sure it's fully valued in the way that it should be, again, as an alternative kind of use of the ocean, along with oil and gas leasing.	Thank you for your comment. BOEM discusses the potential conflicts (along with the positive interactions) of OCS oil- and gas-related activities with tourism, fishing, and recreational uses in **Chapters 4.10, 4.11, and 4.12**.
Rachel Walsh	RW-3	I also feel that the Bureau of Ocean Management fails to consider the alternative values and uses that the Gulf of Mexico provides such as the significant values it provides to the tourism and fishing industries, and I feel these would be greatly depreciated by oil and gas drilling, further oil and gas drilling in the Gulf of Mexico.	Thank you for your comment. BOEM analyzes the impacts of oil and gas production on a number of important habitats, resources, and socioeconomic entities. For specific information on commercial fisheries, recreational fishing, and tourism, refer to **Chapters 4.10, 4.11, and 4.12**, respectively.
Environmental Justice			
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade,	CBD, BL, GRN, LBB, RAHC-13	BOEM Failed to Adequately Consider Environmental Justice Issues and Failed to Quantify the Social and Environmental Costs of its Proposal: BOEM's proposal raises significant environmental justice issues. But BOEM's Draft EIS fails to adequately address these significant impacts, or adequately analyze the social and environmental costs of its proposal. As BOEM is well aware, on February 11, 1994, President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental	BOEM appreciates the extensive detail in this comment, acknowledges that some additional detail/clarification could improve this Multisale EIS, and has taken steps to address each component of the comment with the following revisions to the social factors chapter: • additions to the description of BOEM's outreach efforts to help expand participation

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Attorney		Justice in Minority Populations and Low Income Populations." The Executive Order makes it the responsibility of each Federal agency to "make achieving environmental justice part of its mission in identify and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Accompanying this order was a Presidential Memorandum stating that "each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by [NEPA]." The CEQ has also issued guidance on incorporating environmental justice considerations in the NEPA process. The guidance states in part: Early and meaningful public participation in the federal agency decision making process is a paramount goal of NEPA. CEQ's regulations require agencies to make diligent efforts to involve the public throughout the NEPA process. Participation of low-income populations, minority populations, or tribal populations may require adaptive or innovative approaches to overcome linguistic, institutional, cultural, economic, historical, or other potential barriers to effective participation in the decision-making processes of Federal agencies under customary NEPA procedures. States bordering the Gulf of Mexico are home to a variety of onshore oil and gas infrastructure that support offshore oil and gas drilling activities, including oil refineries. Toxic pollution from these refineries and petrochemical facilities disproportionately impact low income neighborhoods and communities of color. For example, Port Arthur, Texas is home to two facilities that refine more than 900,000 barrels of crude per day. The Environmental Protection	by environmental justice populations; • further clarification as to the status of refineries and other processing facilities in relation to the proposed action (while acknowledging BOEM has no regulatory authority over them) and additional information in the cumulative analysis as to potential negative impacts to coastal communities; • additional language in the cumulative analysis regarding hurricanes, coastal land loss, sea-level rise; and • further clarification in the cumulative impacts chapter regarding the incremental impact of a single proposed lease sale. Additional quantification of impacts is included where available. BOEM is currently reviewing the extent to which it is feasible and appropriate to quantify the impacts of climate change. This review will consider various factors, such as the uncertainties inherent in such analyses. BOEM describes the impacts of onshore facilities or activities that contribute to air pollution in coastal communities as a part of the cumulative impacts analysis in **Chapter 4.14.3** (Social Factors). However, BOEM does not have authority to regulate any onshore facilities or activities that contribute to air pollution. For an analysis of the impacts to air quality, refer to **Chapter 4.1**. **Chapter 4.14.3.2.2** acknowledges that, if an accidental event affects more than one county or parish and is measurable with impacts lasting up to 1 year, then the impact would be moderate. The potential impacts as a result of a low-probability

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Agency's Toxics Release Inventory places Jefferson County, where Port Arthur is located, among the worst in the nation for emissions of chemicals known to cause cancer, birth defects, and reproductive disorders. Data collected by the Texas Cancer Registry indicates that cancer rates among African Americans in Jefferson County are roughly 15% higher than they are for the average Texan, and the mortality rate from cancer is more than 40% higher. Moreover, many of these communities are also on the frontlines of climate change, with severe storms like Hurricane Katrina displacing people. And, as explained above, coastal areas in Louisiana are eroding at the rate of a football field an hour, meaning the area is losing important buffers to the impacts of hurricanes, meaning that the impacts of such storms on frontline communities are only going to intensify in the future. Additionally, scientists say that at current rates, coastal erosion and sea level rise will lead to nearly all of Southeast Louisiana being under water by 2100, leading to the displacement of even more communities. BOEM's proposal will exacerbate all these impacts by leading to more oil drilling, which will lead to more oil refining, toxic air pollution and greenhouse gas emissions. While BOEM quantifies the purported economic benefits of its proposal, such as job creation and value added impacts, BOEM wholly fails to quantify the negative impacts that would result, such as the quantity of air pollutants from refining and consuming the oil and gas to be extracted and the attendant societal and environmental costs of such emissions. This is despite BOEM's prior quantification of harm caused by air emissions from oil and gas activities represented by dollars per ton for certain pollutants, and a readily available tool to analyze the costs of the greenhouse gas emissions generated by BOEM's proposal—the social cost of carbon. The social cost	catastrophic event like the *Deepwater Horizon* oil spill, however, are not part of a proposed action and are not likely expected to occur. New regulations focusing on improved safety, more regulatory checks, and inspections should decrease the already small likelihood of the occurrence of such spills. Potential impacts as a result of a low-probability catastrophic event are discussed in the *Catastrophic Spill Event Analysis* white paper (USDOI, BOEM, 2017). BOEM recognizes the importance of climate change in its NEPA analyses and considers many facets of the potential effects of climate change in its decisionmaking with respect to oil and gas leasing, whether in the Five-Year Program or lease sale analyses. This Multisale EIS tiers from the Five-Year Program EIS and has included a summary of the greenhouse gas and downstream emissions information that may result from a Gulf of Mexico oil and gas lease sale in **Chapter 4.0**. BOEM acknowledges that methods for quantifying greenhouse gas and potential social costs of such emissions remains the subject of debate. A number of key uncertainties are outlined in BOEM's analysis and, as a result, the current estimates should be treated as provisional because they will evolve with improved scientific and economic understanding. BOEM continues to consider different ways to quantitatively address and disclose downstream greenhouse gas emissions and effects in accordance with CEQs recent directives.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		of carbon was developed by the Interagency Working Group on Social Cost of Carbon, which was convened by the Council of Economic Advisers and the Office of Management and Budget. As explained in the Working Group's report: The purpose of the "social cost of carbon" (SCC) estimates presented here is to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO2) emissions into cost-benefit analyses of regulatory actions that impact cumulative global emissions. The SCC is an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year. It is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change. The working group presents values for social costs from 2015 to 2050, ranging from $11 to $212 (in 2007 dollars per metric ton of CO2). The SCC demonstrates that the benefits of reducing carbon pollution are significant. For example, the proposed rules for reducing power plant carbon emissions calculated the climate benefits and health co-benefits to be $15.6 to $88 billion in 2020 and 32.3 to $151 billion in 2030. However, recent studies have demonstrated that the numeric value assigned to the social cost of carbon vastly underestimates the true cost. The social cost of carbon is therefore a minimum value. Other analytical tools exist to evaluate the cost of methane emissions. The Environmental Protection Agency has peer-reviewed and employed such a tool in its "Regulatory Impact Analysis of the Proposed Emission Standards for New and Modified Sources in the Oil and Natural Gas Sector." BOEM's quantification of the purported economic benefits of its proposal while assigning zero value to the social and environmental costs is both disingenuous and unlawful under NEPA.	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Moreover, its failure to adequately describe and quantify these negative impacts does not comply with its duty to disclose the environmental justice implications. BOEM's analysis of the cumulative impacts of its proposal on environmental justice communities is inadequate for the same reason. Indeed, BOEM seems to dismiss the import of the additional air pollution that could result from its proposal on Gulf communities because there is already significant OCS-related infrastructure in the Gulf states. This approach undercuts the entire purpose of a cumulative impacts analysis and efforts to inform and engage environmental justice communities.	
Sierra Club, Devorah Ancel, Staff Attorney	SC-12	BOEM Failed to Adequately Consider Environmental Justice Issues and Failed to Quantify the Social and Environmental Costs of its Proposal: BOEM's proposal raises significant environmental justice issues. But BOEM fails to adequately address these significant impacts, or adequately analyze the social and environmental costs of continuing oil and gas development contemplated under the proposed lease sales. As BOEM is well aware, on February 11, 1994, President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations." The Executive Order makes it the responsibility of each federal agency to "make achieving environmental justice part of its mission in identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Accompanying this order was a Presidential Memorandum stating that "each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		communities and low-income communities, when such analysis is required by [NEPA]." States bordering the Gulf of Mexico are home to a variety of onshore oil and gas infrastructure that support offshore oil and gas drilling activities, including oil refineries. Toxic pollution from these refineries and petrochemical facilities disproportionately impact low-income neighborhoods and communities of color. Moreover, many of these communities are at ground zero for the impacts of climate change, with sea level rise and wetlands loss already some of the earliest climate migration in the U.S. Scientists estimate that, if current rates of coastal wetlands loss and sea level rise continue, nearly all of southeast Louisiana will be under water by 2100, leading to the displacement of even more communities. The proposed lease sales, or any option that supports the continuing sale of leases in federal waters, will exacerbate all these impacts by leading to more oil drilling, which will lead to more oil refining, toxic air pollution and greenhouse gas emissions. While BOEM quantifies the purported economic benefits of its proposal, such as job creation and value added impacts, BOEM wholly fails to quantify the negative impacts that would result, such as the quantity of air pollutants from refining and consuming the oil and gas to be extracted and the attendant societal and environmental costs of such emissions. This is despite BOEM's prior quantification of harm caused by air emissions from oil and gas activities represented by dollars per ton for certain pollutants, and a readily available tool to analyze the costs of the greenhouse gas emissions generated by BOEM's proposal—the social cost of carbon. The social cost of carbon was developed by the Interagency Working Group on Social Cost of Carbon, which was convened by the Council of Economic Advisers and the Office of Management and Budget. As explained	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		in the Working Group's (hereinafter Working Group) report: The purpose of the "social cost of carbon" (SCC) estimates presented here is to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO2) emissions into cost-benefit analyses of regulatory actions that impact cumulative global emissions. The SCC is an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year. It is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change. The Working Group presents values for social costs from 2015 to 2050, ranging from $11 to $212 (in 2007 dollars per metric ton of CO2). The SCC demonstrates that the benefits of reducing carbon pollution are significant. However, recent studies have demonstrated that their numeric value assigned to the social cost of carbon vastly underestimates the true cost. BOEM's analysis of the cumulative impacts of its proposal on environmental justice communities is inadequate. In particular, its failure to adequately describe and quantify these negative impacts does not comply with its duty to disclose environmental justice implications. BOEM's quantification of the purported economic benefits of its proposal while assigning zero value to the social and environmental costs is disingenuous and unlawful. Indeed, BOEM seems to dismiss the import of the additional air pollution that could result from its proposal on Gulf communities because there is already significant OCS-related infrastructure in the Gulf states. This approach undercuts the entire purpose of a cumulative impacts analysis and efforts to inform and engage environmental justice communities.	
Lone Star	LSCSC-6	Oil spills and air pollution from offshore drilling and	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director		industrial facilities like refineries that support the industry make people sick and disproportionately harm low-income neighborhoods and communities of color. But BOEM fails to adequately analyze the environmental justice impacts of its proposal. For example, BOEM dismisses the import of the additional air pollution that could result from its Proposal on Gulf communities because there is already significant OCS-related infrastructure in Gulf States. This approach undercuts the entire purpose of a cumulative impacts analysis and efforts to inform and engage environmental justice communities, in violation of NEPA.	
No New Leases Form Letter	NNL-2	Moreover, oil spills and air pollution from offshore drilling and industrial facilities like refineries make people sick and disproportionately harm low income neighborhoods and communities of color. BOEM's proposal fails to adequately consider these impacts.	
Katrina Dubytz	KD-1	All right. So, oil spills and air pollution from drilling and refining facilities make people very sick. There's a lot of reports out about various health issues that are caused by it. And especially, they disproportionately harm low- income neighborhoods and communities of color, which is a huge issue for environmental justice. A lot of people don't realize that the people who are being affected are very, like -- sorry, they're like, essentially, like lower SES people who live not necessarily in the cities that are benefiting from the results of drilling and whatnot, but on the outskirts, who don't even benefit from the things that are harming them, whether it be in health or noise pollution, air pollution, whatnot. Or in this case, especially coastal areas that might be affected if there were an oil spill, fishing communities, whatnot; those areas that don't rely on more commercial things that might benefit from said practices.	
Gulf	GRN-11	The environmental justice impacts of oil drilling need	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Restoration Network, Howard Page		to be better considered. Recent accidents have really devastated our fishing industry. They've also devastated our tourism industry. Our dolphin populations are the worst they've ever been, with incidents of infant mortality. Our turtle populations have been harmed. Our oysters are in terrible shape. And our fisherman are suffering from this as well as the tourist industry when people kind of question do they want to come to an area that's known for tarballs and known for dying dolphins and known for bad oyster populations where you can't even eat the local oysters anymore. And as these continuing accidents happen, like Shell, the fishermen continue to have their resource harmed. So I would ask that, too, is that the economic impact to fishermen and other coastal communities that are often environmental justice communities, that that be looked at.	
Renate Heurich	RH-5	One thing that the Environmental Impact Statement did not really look at is, I mean, they mentioned global warming and climate change, but they really did not put a cost, the real cost of climate change as compared to drilling for oil, on there.· And this is going to be immense in terms of health impacts, but also catastrophic weather events, floods, droughts. It's going to affect the ability of people to live in cities where it gets hotter and hotter or to grow food when the land is drying up.	
Renate Heurich	RH-7	Also, the Environmental Impact Statement did not look at, okay, what do we do with the oil and the gas that we are producing, like, if it's going to be transported to refineries. We have people living near refineries and breathing in toxic air. We create toxic byproducts from refining oil. All of that has to go somewhere. We have here in Louisiana the area called "Cancer Alley" with all of the petrochemical factories and refineries, and people are experiencing high levels of cancer and extremely rare cancers, but	The proposed Federal action being analyzed in this Multisale EIS is to offer for lease those areas that may contain economically recoverable oil and gas resources in accordance with the OCSLA, which specifically states "should be made available for expeditious and orderly development, subject to environmental safeguards" (OCSLA, 43 U.S.C. §§ 1331 *et seq.*). The purpose of this Multisale EIS is to evaluate the direct and indirect effects of a proposed action (i.e., a proposed lease sale) as well

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		they can't go anywhere because their houses aren't worth much anymore. And these refineries disproportionally affect the franchise communities, people of color, lower income communities, which is also not right, and it's a big environmental justice issue.	as the incremental contribution of a proposed lease sale to the cumulative effects. BOEM acknowledges that there could be impacts from onshore infrastructure supporting oil and gas activities on the OCS, whether through development and production or through refining onshore. Please refer to **Chapters 4.14.1 and 4.14.3** for a discussion of indirect impacts to land use and coastal infrastructure and social factors (including environmental justice).
Steps Coalition, Jennifer Crosslin, Community Organizer	STEPS-2	The expansion of offshore drilling ensures that her communities and others like it in the Gulf will continue to be poisoned, and it is an injustice not to take into account these communities in the EIS. It is also an injustice that your EIS calculates risk of drilling disaster by the number of spills and not also by the severity of the spill and -- by the severity of the spill and the negligent behavior -- the often negligent behavior of the oil and gas industry reporting and cleaning up spills.	BOEM conducts an oil-spill risk analysis prior to conducting lease sales in OCS areas. This risk analysis includes the probability of oil-spill occurrence, which is based on spill rates derived from historical data (Anderson et al., 2012) and on estimated volumes of oil produced and transported. BOEM seeks to provide a robust analysis of the issues related to a decision of whether and how to proceed with oil and gas lease sales in the Gulf of Mexico. Our analysis of oil-spill risk, which is detailed in **Chapter 3.2.1**, includes detailed discussions of offshore spills <1,000 bbl and ≥1,000 bbl, and coastal spills. As described in **Chapter 3.2.1.4.2** (Trajectory Modeling for Offshore Spills ≥1,000 bbl), the Bureau of Ocean Energy Management's OSRA model simulates the trajectory of thousands of spills throughout the Gulf of Mexico OCS and calculates the probability of these spills being transported and contacting specified geographic areas and features. Using the OSRA model, BOEM estimates the likely trajectories of hypothetical offshore spills ≥1,000 bbl. Only spills ≥1,000 bbl are addressed because smaller spills are not likely to persist long enough to be simulated by trajectory modeling. For this analysis, the OSRA model was run for Alternatives A, B, and C (**Tables 3-2 and 3-3**) and

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			the Cumulative OCS Oil and Gas Program (2017-2086). **Chapter 4.14.3.2.2** discusses the potential for oil spills to contact coastal communities. In addition to modeling oil spills, **Chapter 3.2.1.1.1** (Trends in Reported Spill Volumes and Numbers) reports the total number and volume of oil spills reported to USCG from various sources, including barges, tankers, pipelines, and platforms. The analysis reported in Etkin (2009) reinforces the fact that hurricanes are the most common cause of spills from both platforms and pipelines; it also reports that structural failures (e.g., corrosion) account for a significant percentage of the total volume of spilled oil from offshore pipelines. Preventative measures are taken, including inspecting pipelines at routine intervals and using corrosion resistant or corrosion-inert materials. In addition, when pipelines are protected by rectifiers or anodes for which the initial cathodic protection system either cannot be calculated or calculations indicate a life expectancy of less than 20 years, the pipelines are inspected annually. Also, refer to **Chapter 3.1.6.1** (Structure Age and Idle Iron) and **Chapter 3.2.4** (Pipeline Failures), which is where BOEM addresses potential environmental hazards and impacts relating to pipelines. Please refer to **Chapters 3.2.1.4 and 3.2.1.5** and the response to Comment CBD, BL, GRN, LBB, RAHC-13.
Mississippi Coalition for Vietnamese-American Fisher Folk and Families, Thao Vu,	MCVAFFF-5	Not only was it the largest environmental disaster, but it caused huge social, economic as well as health impacts and concerns, particularly for fishing communities along the Gulf. There are many in Louisiana, here in Mississippi, Alabama, Florida, and Texas. And they were disproportionately impacted by this disaster, and they still haven't recovered	The Trustees have reached a settlement with BP to resolve BP's liability for natural resource injuries resulting from the *Deepwater Horizon* oil spill. Under this settlement, BP will pay up to $8.8 billion for restoration. Based on the Trustees' thorough assessment of

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Director		because the disaster really deeply devastated the Gulf of Mexico, its habitats, its fisheries, right.	impacts to the GOM's natural resources, they selected the comprehensive, integrated ecosystem restoration approach for restoration implementation. This approach is outlined in the comprehensive restoration plan, which will allocate funds from the settlement for restoration over the next 15 years. The plan, and information on the settlement with BP (called the Consent Decree), can be found at http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan. **Chapter 4.14.3.2.2** acknowledges that, if an accidental event affects more than one county or parish and is measurable with impacts lasting up to 1 year, then the impact would be moderate. The potential impacts as a result of a low-probability catastrophic event like the *Deepwater Horizon* oil spill, however, are not part of a proposed action and are not likely expected to occur. New regulations focusing on improved safety, more regulatory checks, and inspections should decrease the already small likelihood of the occurrence of such spills. Potential impacts as a result of a low-probability catastrophic event are discussed in the *Catastrophic Spill Event Analysis* white paper (USDOI, BOEM, 2017). Please refer to the response to Comment CBD, BL, GRN, LBB, RAHC-13 for information on BOEM's environmental justice analysis.
Topic 5 – Cumulative Analysis			
American Petroleum Institute (API), Andy Radford	API-9	As BOEM recognizes, a good NEPA analysis considers the cumulative impacts of the proposed action and alternatives . "Cumulative impact" is "the impact on the environment which results from the incremental impact of the action when added to other	BOEM appreciates the substantive content of this comment. BOEM has reviewed all cumulative impact analyses in each resource chapter in **Chapter 4** of this Final Multisale EIS and has added clarification to ensure that the baseline conditions

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		past, present, and reasonably foreseeable future actions regardless of what agency…or person undertakes such actions…." 40 C.F.R. § 1508.7 (emphasis added). Although the DEIS accounts for impacts associated with many other past, present, and future actions affecting the same resources as the lease sales, it presents the information in tables that can appear somewhat misleading and overstate the impacts of the leasing actions under consideration. This may be because the agency conflates the impacts of these other factors with the cumulative, incremental impacts of the proposed lease sales. For example, the "impact-producing factors" (Table 4-4 on p. 4-51) indicates that the cumulative impact of "OCS Oil and Gas" on estuarine systems will be "moderate," while the cumulative impact of non-OCS oil and gas on estuarine systems will be "major." From the discussion in the impact analysis, it appears that BOEM is saying that the incremental impact of OCS oil and gas activities on those systems is "minor" when added to the past, present, and reasonably foreseeable future impacts of non-OCS oil and gas activities. However, the table could easily be misinterpreted to mean that the otherwise "minor" impacts of OCS oil and gas activities will become incrementally "major" when added to other past, present, and reasonably foreseeable future non-OCS oil and gas activities. This interpretive issue is present in many of the "impact-producing factors" tables contained in Chapter 4 of the DEIS. See, e.g., Table 4-5 at p. 4-75. At a minimum, BOEM should revise these tables to ensure that the cumulative, incremental impact of the proposed action(s) (i.e., lease sales) is made clear and distinct from the impacts of other actions that BOEM is not proposing to undertake. This problem is particularly pronounced in the analysis of impacts to land use and coastal infrastructure, which	and the effects of past actions, events, and ongoing activities are accounted for in the analysis. Additional clarification has been added to the impact tables in each chapter as well, e.g., **Table 4-1** in **Chapter 4.1.2**. Specifically, BOEM has reviewed the impact assessment for land use and coastal infrastructure to ensure its accuracy and consistency. Revisions to the text can be found in **Chapter 4.14.1**. Specifically, the chapter on land use and coastal infrastructure has been revised accordingly. The greatest confusion has been addressed by removing the sentence, "Negative and positive impacts are measured on that scale." Land use and coastal infrastructure is the only chapter in this Multisale EIS that defined impact measures as potentially negative and/or positive across the impact-level range of negligible, minor, moderate, and major. The table that shows cumulative impacts as "negligible to major" did not mean major *negative* impacts, but major *positive* impacts. When the table in question (page 4-373 of the Draft Multisale EIS) was transferred to the "Alternative Comparison Matrix" table (page xvii of the Draft Multisale EIS), this critical distinction was lost, i.e., the fact that an impact could be a positive impact. While the original approach held that impacts could be positive (or negative) across the range of negligible to major, the chapter has been revised to address the need for clarification and to avoid confusion. Rather than considering positive impacts as scalable (from negligible to major), they simply have been termed "beneficial." Also, the cumulative impacts chapter in each resource chapter has been revised to more clearly describe the methodological approach. Specifically,

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		appears to contain a number of additional internal inconsistencies. For example, on p. xxvii of the DEIS, BOEM explains that "[b]ecause OCS oil- and gas-related activities are supported by [a] long-lived, expansive onshore network, the potential impacts of a proposed lease sale are not expected to produce any major impacts to land use and coastal infrastructure." Yet the impact levels for land use and coastal infrastructure indicated in the "Alternative Comparison Matrix" Table 1 on p. xvii of the DEIS are the only impacts associated with OCS oil and gas leasing characterized as potentially "major." DEIS at pp. xvi-xvii. Moreover, examination of the impact analysis for land use and coastal infrastructure in Chapter 4 of the DEIS indicates nominally "negligible" to "moderate" impacts on land use and coastal infrastructure. Yet the cumulative impacts portion of the "impact-producing factors" table on p. 4-373 indicates a potentially "major" cumulative impact. In contrast, the substantive cumulative impact analysis on p. 4-384 of the DEIS indicates a "minor" incremental impact. All this apparently conflicting information makes it difficult to determine the degree of impact, cumulative or otherwise, that the proposed lease sales are expected to have on land use and coastal infrastructure, and needs to be harmonized or explained. At a minimum, BOEM should revisit the impact assessment for land use and coastal infrastructure to ensure its accuracy and consistency. API suggests BOEM incorporate the changes below in regards to clarifying analyses (see below) and by incorporating more clear description of the methodology used to determine cumulative impacts, including clear documentation of the evidence used to determine impact levels that inform the cumulative analysis. Although the source of these apparent inconsistencies is unclear, it may be associated with BOEM confusing the relatively minor	each chapter was reviewed to ensure a detailed discussion of the small incremental contribution of one proposed lease sale when added to the cumulative impacts of all past lease sales and the baseline, etc., along with a discussion of the rationale behind the temporal and spatial bounds of the analysis. Additional documentation has been added to the resource chapters, where appropriate, as well.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

<table>
<tr><th>Commenter</th><th>Comment ID</th><th>Comment</th><th>Response</th></tr>
<tr><td></td><td></td><td>incremental cumulative impact of the proposed lease sales with the impact of other (i.e., non-OCS oil and gas related) activities. At a minimum, BOEM should revisit the impact assessment to ensure accuracy and consistency through this DEIS as additional NEPA review for later decisions to hold any of the individual lease sales will tier heavily from this current DEIS.</td><td></td></tr>
<tr><td>Brenda Warger</td><td>BW-2</td><td>Also I am in opposition because I feel that BOEM underestimates the amount of climate changes gases and their environmental impact because they fail to adequately analyze past, present and future foreseeable actions in the Environmental Impact Statement.</td><td rowspan="2">BOEM recognizes the importance of climate change and considers many facets of the potential effects of climate change in its decisionmaking with respect to oil and gas leasing, whether in the Five-Year Program or lease sale analyses. In the Five-Year Program EIS, BOEM compares greenhouse gas emissions from direct OCS emissions to those that could occur from energy substitutes that would presumably replace OCS production in the absence of a new OCS Program and comparable demand levels. Downstream greenhouse gases have been quantified. Please refer to the Five-Year Program EIS for additional information about greenhouse gas emissions and climate change. BOEM expects that reducing OCS oil and gas consumption in the U.S. and the associated emissions from limiting OCS leasing would largely be offset by substitutes from other energy sources, either within the United States or elsewhere. BOEM has considered a no action alternative (i.e., cancellation of a proposed lease sale); however, that does not necessarily equate to zero downstream greenhouse gas emissions from oil and gas unless energy demand or supply changes drastically or cost-competitive clean energy sources are substituted.

This Multisale EIS tiers from the Five-Year Program EIS and has included a summary of the information in Chapter 4.0.</td></tr>
<tr><td>David Underhill</td><td>DU-1</td><td>And that makes it the duty of BOEM to consider the cumulative impact of these leases have on the effects on the climate when the oil and gas extracted from the leases is burned.</td></tr>
</table>

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Mississippi Coalition for Vietnamese-American Fisher Folk and Families, Thao Vu, Director	MCVAFFF-7	And, you know -- and we think that the development of this Environmental Impact Statement, which I only have a small summary, but that larger one, 700 page or more, we think that in terms of development, that is a backward process and it causes more injustices, because we believe that you need to fully assess the impacts as well as the cumulative impacts to these communities who depend on healthy -- a healthy Gulf of Mexico, its ecosystems, the habitats, and its fisheries, right. And if you're proposing a plan that they don't even know about or they can't access, that's even causing more injustices, right. And we believe that's very serious, right.	BOEM is working with the Mississippi Coalition for Vietnamese American Fisher Folks and Families to identify their needs and future outreach opportunities. BOEM met with the Mississippi Vietnamese community and fishermen on Friday, July 15, 2016, in Gautier, Biloxi, Gulfport, and Pass Christian, Mississippi, to tour their boat docks and discuss their concerns. The fishermen believe that the *Deepwater Horizon* oil spill and spill response has impacted the oyster and coastal brown shrimp populations. The *Deepwater Horizon* oil spill and spill response is causing the fishermen more expenses because they need to go farther offshore to shrimp. BOEM is following up with government contacts to check on the oyster and brown shrimp populations and the potential reasons for the decrease.
Community Advocate	CA-1	A review [of] the EIS indicates the failure in complying with the NEPA process, it does not present an analysis of the cumulative impacts of past, present, and proposed leasing plan.	Thank you for your comment. Each resource chapter was reviewed, and clarifying language was added to ensure that the incremental, program, non-OCS, and reasonably foreseeable impacts were clearly identified.
Topic 6 – Oil Spills			
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB,	CBD, BL, GRN, LBB, RAHC-8	BOEM Failed to Adequately Consider the Risks of an Oil Spill: BOEM also dismisses the import of routine and large oil spills because the transport of oil and gas is federally regulated. However, transporting oil and gas is inherently dangerous and spills occur as a matter of course in offshore oil and gas operations from both tankers and pipelines. BOEM must give consideration of impacts from such spills proper weight. BOEM's Draft EIS states that the vast majority of oil and gas extracted in the Gulf of Mexico is transported via pipeline. A review of records of the federal Pipeline and Hazardous Materials Safety Administration, which maintains a database of all U.S. pipelines, demonstrates that transport of oil and gas carries a significant risk of environmental and	Thank you for your comment. BOEM seeks to provide a robust analysis of the issues related to a decision of whether and how to proceed with oil and gas lease sales in the Gulf of Mexico. Our analysis of oil-spill risk, which is detailed in **Chapter 3.2.1**, includes detailed discussions of offshore spills <1,000 bbl and ≥1,000 bbl, and coastal spills. As described in **Chapter 3.2.1.4.2** (Trajectory Modeling for Offshore Spills ≥1,000 bbl), the Bureau of Ocean Energy Management's OSRA model simulates the trajectory of thousands of spills throughout the Gulf of Mexico OCS and calculates the probability of these spills being transported and contacting specified geographic areas and features. Using the OSRA model, BOEM estimates the likely

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
RAHC), Kristen Monsell, Staff Attorney		public safety impacts. Nationally, there were nearly 8,000 significant incidents with U.S. pipelines, involving death, injury, and economic and environmental damage between 1986 and 2013—more than 300 per year. Incidents classified as "significant" are those resulting in death or injury, had damages more than $50,000, spilled more than five barrels of highly volatile substances or 50 barrels of other liquid, or where the liquid exploded or burned. And offshore spills occur as a matter of course in the Gulf of Mexico. For example, in 2015, an offshore natural gas pipeline in Gulf of Mexico ruptured, causing a fire that injured two workers. And in 2016, nearly 90,000 gallons of oil leaked from a flow line that created an oil sheen in the Gulf of Mexico that was two by 13 miles wide. In fact, the U.S. Department of Transportation found that offshore pipelines can be more vulnerable than onshore pipelines. They have a greater vulnerability to severe weather conditions than onshore pipelines, especially during hurricane events. And massive wave action can alter the pipeline stability, causing gradual displacement, especially in small diameter pipelines. Offshore pipelines can also face more corrosion than onshore pipelines due to higher temperature and pressure conditions that occur during the laying of these pipelines. In addition, aging poses risks of corrosion, erosion and fatigue stress to subsea pipelines. Subsea pipeline corrosion appears to accelerate over time, and can act synergistically with fatigue stress to increase the rate of crack propagation. Marine environments are especially known to produce significant corrosion on steel surfaces, and when a steel structure is at or beyond its elastic limit, the rate of corrosion increases 10-15%. One offshore pipeline study found that after 20 years the annual probability of pipeline failure increases rapidly, with values in the	trajectories of hypothetical offshore spills ≥1,000 bbl. Only spills ≥1,000 bbl are addressed because smaller spills are not likely to persist long enough to be simulated by trajectory modeling. For this analysis, the OSRA model was run for Alternatives A, B, and C (**Tables 3-2 and 3-3**) and the Cumulative OCS Oil and Gas Program (2017-2086). In addition to modeling oil spills, **Chapter 3.2.1.1.1** (Trends in Reported Spill Volumes and Numbers) reports the total number and volume of oil spills reported to USCG from various sources, including barges, tankers, pipelines, and platforms. The analysis reported in Etkin (2009) reinforces the fact that hurricanes are the most common cause of spills from both platforms and pipelines; it also reports that structural failures (e.g., corrosion) account for a significant percentage of the total volume of spilled oil from offshore pipelines. Preventative measures are taken, including inspecting pipelines at routine intervals and using corrosion resistant or corrosion-inert materials. In addition, when pipelines are protected by rectifiers or anodes for which the initial cathodic protection system either cannot be calculated or calculations indicate a life expectancy of less than 20 years, the pipelines are inspected annually. Also, refer to **Chapter 3.1.6.1** (Structure Age and Idle Iron) and **Chapter 3.2.4** (Pipeline Failures), which is where BOEM addresses potential environmental hazards and impacts relating to pipelines.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		range of 0.1 to 1.0, which equates to a probability of failure of 10% to 100% per year. Another study covering 1996-2010 found that accident incident rates, including spills, increased significantly with the age of infrastructure. Consistent with these findings, a report published in 2010 found that the number of oil spills from offshore rigs and pipelines between 2000 and 2009 *more than quadrupled* the rate of spills in prior decades. In particular, from the early 1970s through the 1990s, offshore rigs and pipelines averaged about four spills per year of at least 2,100 gallons. The average annual total skyrocketed to more than 17 from 2000 to 2009, and averaged 22 per year from 2005 to 2009 alone. And the number of spills, as well as the quantity of spilled oil, grew significantly worse even when taking increased production in account. Federal data show that new pipelines also carry a high risk of spills, mostly because of faulty design or construction. These data indicate there are more oil spills in the first two years of pipeline's life than in the next seven years combined. This is a significant concern given that BOEM estimates a single lease sale could result in the installation of up to 1,330 miles of new offshore pipelines. BOEM must therefore conduct a more thorough analysis of the risks and effects of oil spills in the Gulf of Mexico.	
Sierra Club, Devorah Ancel, Staff Attorney	SC-5	BOEM's Risk Analysis for Offshore Spills Does Not Adequately Consider the Inherent Dangers of Deepwater and Ultra-Deepwater Drilling: In its risk analysis for offshore spills greater or equal to 1,000 barrels, BOEM calculated spill rates "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." This analysis fails to take into account the risks inherent in deepwater drilling. The lease sales at issue encompass high risk ultra-deepwater areas,	BOEM acknowledges that, with respect to oil spills, the potential for a blowout to result in a large oil spill may be greater in deep water than in shallow water because BOEM's resource assessment studies show a higher probability of large oil reservoirs being discovered and produced in deep water as compared with shallow water (DeCort, official communication, 2012). BOEM provides an analysis of a catastrophic oil spill in the *Catastrophic Spill Event Analysis* white paper (USDOI, BOEM, 2017) because a spill of that magnitude is not reasonably

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		close to 11,000 feet deep, and contain large areas of high risk formations many of which will produce high pressure/high temperature wells. The increased risk of spills and disasters associated with these high risk conditions must be part of BOEM's spill risk calculus. Moreover, the Draft EIS bases its risk analysis of spills greater than 1,000 barrels on a report that uses spill data through 2010 which doesn't account for the recent expansion of ultra-deepwater drilling. Since 1992 when deepwater exploratory drilling began in earnest, a total of 244 wells have been drilled in ultra-deep waters. As of 2013, there were 136 ultra-deepwater wells in operation. This number is a significant jump from 2009 when there were only 65 ultra-deepwater wells in operation. The Draft EIS analysis of spill risk through 2010 omits potential significant increases in the risk of a spill, or even catastrophic spill, associated with the significant spike in ultra-deepwater drilling in recent years. This analysis must be corrected and considered when evaluating the risk of developing the unique deepwater areas encompassed within the proposed lease sale areas. In addition, the industry has developed a "mechanical risk index" ("MRI") which calculates the complexities present in deepwater oil drilling in the Gulf of Mexico based on a number of factors and then rates the complexity of the well on a 1 to 5 scale with 5 being the most complex. Those factors include the water depth (ranging from >3,200 feet to >6,700 feet), well depth (ranging from >19,000 feet to >30,000 feet), the number of casings strings, and the percent population penetrating salt. The Deepwater Horizon well represents a 3+ to 4 in these rankings. As of 2009, only 43 wells were drilled in the Gulf of Mexico with a complexity level of 3, 4, or 5 which would indicate that the actual likelihood of catastrophic failure for wells of this nature based on past oil spills could be as high as	foreseeable and not part of a proposed action (Ji et al., 2014). Deepwater and ultra-deepwater wells require complex infrastructure, planning, and execution to construct; therefore, facilities and the volume of production tend to get larger with distance from shore and water depth (Shultz, 1999). The complex nature of the formations, combined with the drilling depths in high-pressure/high-temperature conditions required to reach the target zones, presents a challenge to drilling engineers (Close et al., 2008). This challenge is highlighted in the greater number of casing strings required to drill to target depth, which in turn creates the challenge in achieving good cement isolation in a tight tolerance annuli (Close et al., 2008; Chatar et al., 2010). Despite such challenges, over 4,115 deepwater boreholes have been drilled as of September 2016 (where deep water is considered >1,000 ft [305 m]). Of these, the *Macondo* well is the only exploration well to involve a blowout and large oil spill. No spills have occurred for deepwater development wells. Risk analyses may be characterized as "hazard based" or "risk based." A hazard-based analysis examines the possible events regardless of their low (or high) likelihood. For example, a potential impact would not lose significance because the risk has been reduced due to an increase in the level of control, such as engineering standards. While limiting leasing (i.e., cancelling lease sales) might reduce risk, BOEM considers a key to managing risk is through implementing a rigorous regulatory regime to ensure that postlease drilling activities are conducted in a safe manner, whether those activities occur in shallow water or in deep water. A

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		1 in 43. BOEM's risk analysis for high volume catastrophic events wholly ignores the unique characteristics of ultra-deepwater as a risk factor of drilling in the proposed lease sale areas. This must be corrected.	risk-based analysis, on the other hand, takes into account the likelihood of the event occurring and the measures that can be taken to mitigate against its potential impacts.
Renate Heurich	RH-2	I'm also really concerned about the fact that a lot of those leases are in areas that are very deep. Half of it is as deep as the Deepwater Horizon or deeper, which means it's really risky to drill that deep.	The Bureau of Ocean Energy Management's OSRA is designed for use as a risk-based assessment. The OSRA uses two basic criteria in selecting the volume of oil handled as the primary exposure variable: (1) the exposure variable should be simple to define; and (2) it should be a quantity that can be estimated. In this regard, historical data on the volume of OCS oil handled, and associated oil spills, is readily available. In addition, as part of the OSRA analysis, a cluster analysis is used to further divide the geographic domain into additional subareas based on water depth. Cluster analysis is a multivariate technique that groups entities based on similar characteristics and identifies offshore areas that show similar risk. Please refer to the OSRA for additional information. Recently, a BOEM/BSEE-sponsored study entitled *2016 Update of Occurrence Rates for Offshore Oil Spills* updated the previous work presented in Anderson et al. (2012). While this update includes oil spills reported through 2015, it also examines causal factors associated with each individual spill. The information in this report has been incorporated into this Final Multisale EIS. While there will always be incomplete or unavailable information regarding offshore spills that could conceivably result in potential future shifts in baseline conditions and affect BOEM's decisionmaking, BOEM has determined that it can make an informed decision on a proposed lease sale using the most recent spill information provided in ABS Consulting, Inc. (2016). Through the tiered NEPA process for oil and
John Young	JY-5	Here on the south most tip of Texas, Shell and other oil and gas companies have boasted to industry insiders and investors regarding their offshore operations 135 miles due east of Brownsville, TX. But there's been nothing in the local news about how, for example, Shell has drilled deeper and pressed the limits harder there than BP's catastrophic Deepwater Horizon. [See See "Drilling picks up across the Perdido Foldbelt," Anne Leonard & Tom Liskey, Offshore, 01-13-2016, http://www.offshore-mag.com/articles/print/volume-76/issue-1/gulf- of-mexico/drilling-picks-up-across-the-perdido-foldbelt.html/]	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			leasing, future BOEM environmental reviews can take into account any new information that may emerge.
Sierra Club, Devorah Ancel, Staff Attorney	SC-6	BOEM Failed to Adequately Analyze the Impacts of a Catastrophic Spill: As described in more detail below, the 2010 BP Deepwater Horizon disaster which spilled 206 million gallons of oil into the Gulf has had devastating impacts on Gulf of Mexico ecosystems, the livelihoods of Gulf communities, and the tourism industry. The Gulf has endured other catastrophic spills, including a 140 million gallon spill in 1979. In 2004, Hurricane Ivan struck a Taylor Energy offshore platform causing hundreds of gallons to leak into the Gulf for over a decade; and, recent reports indicate a dramatic spike in the size of oil sheens in the vicinity and increased volumes of spilled oil in the past two years. Nearly 10,000 smaller spills have been reported between 2010 and 2015 in the Gulf of Mexico. In addition, numerous other catastrophic spills in other parts of the world have devastated marine ecosystems and the communities that depend upon them. The question is not if there will be a catastrophic spill event, it is when there is such an event what are the impacts and what are the response capabilities of the industry, government and other stakeholders. Oil spills cause irreversible damage to marine and coastal environments, and the destructive impacts of large spills are immediate and severe. Oil spills and cleanup are also disruptive to ship traffic and detrimental to impacted shorelines, subsistence activities, commercial and recreational fishing, tourism, and the health of people living along the coast and people involved in clean-up efforts. BOEM largely dismisses the impacts of a catastrophic oil spill concluding that such an event has a "low probability" of occurring and is "not reasonably foreseeable." Further, the Draft EIS oddly states that	BOEM determined that, because a catastrophic event like the *Deepwater Horizon* explosion, oil spill, and response is not considered reasonably foreseeable as a result of a proposed action, the analysis should be removed from this Multisale EIS to avoid confusion over whether it is or is not part of a proposed action. This is allowed under CEQ's regulations, which removed the requirement to analyze worst-case scenarios. However, in accordance with CEQ guidance and to inform the public of the potential impacts in the unlikely event of such a spill (though not reasonably foreseeable), BOEM has made this information available to the public through its website. BOEM also acknowledges that one of the key ways of managing the risk of such an event is to implement a rigorous regulatory regime to ensure that postlease drilling activities are conducted in a safe manner. For a detailed analysis of reasonably foreseeable impacts associated with a low-probability catastrophic spill, such as the *Deepwater Horizon* explosion and oil spill, refer to the *Catastrophic Spill Event Analysis* white paper (USDOI, BOEM, 2017).

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		a catastrophic oil spill event is "not part of the proposed action." Indeed, an unintended consequence with potential adverse impacts is never part of the proposed action, but it nevertheless must be evaluated as part of the NEPA process. BOEM deflects all analysis of a catastrophic event by simply referencing the Catastrophic Spill Event Analysis white paper prepared after the Deepwater Horizon spill. Further, in the Proposed Five Year Plan document, BOEM largely dismisses the impacts of a catastrophic oil spill reasoning that oil and gas activities are regulated and changes have been implemented since Deepwater Horizon. These assumptions are particularly troubling given that several recently published federal studies have found that necessary regulatory changes have in fact not yet been implemented, and the causes of the Deepwater Horizon oil spill still have not been fully addressed. Moreover, BOEM's sister agency, BSEE, "has not fully addressed deficiencies in its investigative, environmental compliance, and enforcement capabilities identified by investigations after the Deepwater Horizon incident," and accordingly, the agency is not able to effectively oversee offshore oil and gas development. BOEM's failure to adequately assess the true impacts of a catastrophic spill event within the Draft EIS is a violation of NEPA and must be corrected.	
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-18	BOEM must analyze the impacts of a catastrophic oil spill. BOEM dismisses the impacts of a catastrophic oil spill because oil and gas activities are regulated and changes have been implemented since Deepwater Horizon. But this assumption ignores several federal studies published since the disaster finding that sufficient regulatory changes are still lacking. It also ignores the reality that transporting oil and gas is inherently dangerous and spills occur as a matter of course in offshore oil and gas operations	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		from both tankers and pipelines.	
Cyrus Reed	CR-9	And, you know, finally -- I guess I'll try to do this in written form -- but I would make the argument, they haven't really analyzed the impacts in the EIS of a catastrophic oil spill, like the one that occurred six years ago, in making sure that you look at that situation again and what's changed since six years ago, I think would be important.	
No New Leases Form Letter	NNL-4	And finally, offering new offshore oil and gas leases puts marine wildlife and our coasts at risk of oil spills and other damage. The Gulf of Mexico is still reeling from the Deepwater Horizon disaster. New offshore oil development will accelerate deepwater drilling and fracking, increasing the risk of yet more accidents and spills and again, BOEM's proposal fails to sufficiently analyze these threats.	BOEM is very concerned about the potential impacts of oil spills on the environment. In this Multisale EIS, OCS oil- and gas-related oil spills are analyzed in the "Accidental Events" chapters, and other spills (e.g., in State waters or from other sources on the OCS) are analyzed in the "Cumulative Impacts" chapters for all relevant resources. As impacts from the *Deepwater Horizon* explosion, oil spill, and response continue to be assessed, additional analyses will be completed at the site-specific approval stage and in future Supplemental EISs. While limiting leasing (i.e., cancelling proposed lease sales) might reduce risk, BOEM considers a key to managing risk is through implementing implement a rigorous regulatory regime to ensure that postlease drilling activities are conducted in a safe manner, whether those activities occur in shallow water or in deep water. Please refer to **Appendix A** for information on BOEM's and BSEE's rigorous postlease processes. Safety measures and technologies have increased since the *Deepwater Horizon* oil spill. A fact sheet on research and regulatory reforms can be found on BOEM's website at http://www.boem.gov/2017-2022-GOM-Multisale-Public-Meeting-Handouts-Visuals/.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			Please refer to **Chapter 3.2.1** for more information on oil-spill risk assessment.
Harriett E. Myers	HM-3	Oil disasters affect the lives of sea life; the availability of seafood for the seafood industry, & for my table are affected. Tourist industries are also affected.	Thank you for your comment. BOEM acknowledges the potential harmful impacts to sea life, the seafood industry, and the tourism industry as a result of an oil spill. These negative consequences are analyzed for each resource chapter in **Chapter 4** and in the *Catastrophic Spill Event Analysis* white paper (USDOI, BOEM, 2017). For the analysis related to coastal habitats (including wetlands and beaches), please refer to **Chapter 4.3**; for birds, please refer to **Chapter 4.8**; for protected birds, please refer to **Chapter 4.9.4**; and for recreational resources (tourism), please refer to **Chapter 4.12**.
Harriett E. Myers	HM-4	The coast is not immune to damage. Spills harm seabirds and coastal birds, coastal plants including habitat for spawning, beaches for the pleasure of citizens & tourists.	
Gulf Restoration Network, Johanna de Graffenreid	GRN-3	We have seen numerous leaks from existing or plugged wells in the Gulf. Until these leaks can be studied on a cumulative level, pursuing new drilling is irresponsible and does not allow for comprehensive risk analysis in an EIS of this size.	BOEM is currently unaware of any issues related to the decommissioning of offshore wells, including plugging, sealing, and abandonment. A review of spill data reported to both USCG and BSEE provides no information showing abandoned wells are currently leaking. This issue is independent from the leaking wells from the Taylor Energy platform that was lost during Hurricane Ivan and which is located in Mississippi Canyon Block 20. Additional information regarding this issue has been incorporated into this Final Multisale EIS. BOEM's analysis in this Multisale EIS acknowledges the risks of accidental spills and events, even in light of the rigorous safety regulations in place. Accidental events are identified and described in **Chapter 3.2**. Potential impacts from these activities are analyzed in each resource chapter in **Chapter 4**. Nevertheless, BOEM acknowledges that, even with

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			the stringent standards, risk is not wholly eliminated. For example, **Table 3-17** acknowledges that, even with application of these standards, certain small spills (≥1.000 bbl) may be reasonably foreseeable. BOEM/BSEE are constantly evaluating and responding to potential risks through strengthening enforcement and inspection, and continually updating regulatory requirements.
Hilton Kelley	HK-5	So, we need to do more to help protect our Gulf. We need to do more to explore renewable energies in ways we could get off of fossil fuels and ways we can save our wildlife. Because as we know, a lot of birds each year get caught in some of the oil spills because they can't differentiate whether or not it's water or oil in the water when they land and they are being destroyed.	This Final Multisale EIS analyzes the harm spills can have on seabirds and coastal birds; the analysis can be found in **Chapter 4.8**. In this Final Multisale EIS, the impact analysis of oil spills includes much pertinent information on impacts on seabirds and coastal birds by the *Deepwater Horizon* explosion, oil spill, and response. BOEM also used the Oil Spill Risk Analysis model to forecast potential impacts of future large spills that may impact seabirds and coastal birds. This analysis can be found in **Chapter 4.8.2** (Environmental Consequences) of this Final Multisale EIS. BOEM determined that an analysis of the potential for alternative energy is outside the scope of this Multisale EIS for a proposed action. The purpose and need identified for this Multisale EIS is to provide an analysis of the environmental impacts of oil and gas leasing. However, BOEM does recognize the need to investigate the potential for alternative energy on the Federal OCS, and this is addressed in the Five-Year Program EIS (Chapters 1.4.6.1 and 2.7.4), from which this Multisale EIS tiers. BOEM's Office of Renewable Energy is responsible for developing an offshore renewable energy program in the Gulf of Mexico. Information on BOEM's renewable energy program, OCS leases, and renewable energy projects (34 proposed or currently in development) is available on BOEM's website at

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			http://www.boem.gov/Renewable-Energy/.
Leon Soil and Water Conservation District Supervisory Board in Leon County, Florida, Brian Lee	LSWCDSB-2	And the other issue very strongly related to that is the severity of more spills and accidents occurring in the Gulf, happening as climate change becomes exacerbated. So as the climate gets worse, there are going to be more storms, and as there are more storms, the equipment used for drilling and developing fossil fuels in the Gulf is more at risk to damage and causing even more spills.	While it is possible that, as a result of climate change, both the number and severity of hurricanes may increase, the Bureau of Ocean Energy Management's OSRA estimates the risk of oil-spill contact to sensitive offshore and onshore environmental resources and socioeconomic features. Included in this analysis are trajectory simulations based on historical surface ocean currents and winds, which incorporate periods of hurricane conditions. In addition, BSEE provides a robust set of regulations relating to hurricane preparedness that help lower the risk of oil spills occurring and help prevent any loss of life. The effects of hurricanes on coastal areas and oil and gas structures are discussed in **Chapters 3.1.6.1 and 3.2.1.1** and in the resource sections in **Chapter 4**. The effects of climate change and sea-level rise on coastal areas is discussed in **Chapters 3.3.2.8.1 and 3.3.2.10** and in the resource sections in **Chapter 4**. Additionally, **Chapter 3.2.1.1.1** (Trends in Reported Spill Volumes and Numbers) reports the total number and volume of oil spills reported to USCG from various sources, including barges, tanks, pipelines, and platforms. The analysis reported in Etkin (2009) not only reinforces the fact that hurricanes historically are the most common cause of spills from both platforms and pipelines but also reports that structural failures (e.g., corrosion) also account for a significant percentage of the total volume of spilled oil from offshore pipelines. As noted above, BSEE and BOEM's rigorous safety regulations require industry to ensure they are sufficiently prepared for hurricanes, both to prevent spills and to respond to any spills that do happen.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Restore Mississippi Sound, Sharon Hayes, Director	RMS-1	The EIS seriously underestimates the health of the Gulf and its aquatic life. It underestimates the impacts of the BP oil spill, the amount of oil and the dispersant remaining in the water, and their effects on marine mammals, fish, and other aquatic life. The analysis says that the probability of another large spill is so small that its possible effects are not considered in the EIS. And the model that they used to assess the impacts of oil spills, SYMAP, is not designed to handle large spills. Given that they use that model, it would be overwhelmed if they -- if they considered the damaging effects of large spills.	The Department of the Interior has adopted the definition of scientific and scholarly integrity as the condition resulting from adherence to professional values and practices, when conducting and applying the results of science and scholarship, that ensures objectivity, clarity, reproducibility, and utility and that provides insulation from bias, fabrication, falsification, plagiarism, outside interference, censorship, and inadequate procedural and information security. For more information on this policy and contact information for BOEM's Scientific Integrity Officer (http://www.doi.gov/scientificintegrity/Scientific-Integrity-Officers.cfm), visit DOI's webpage on the Integrity of Scientific and Scholarly Activities (http://www.doi.gov/scientificintegrity/index.cfm). BOEM has determined that the analysis in this Multisale EIS is centered on credible scientific research and addresses any gaps in information, including any related to the *Deepwater Horizon* explosion, oil spill, and response. This includes the incorporation of publicly available data from the PDARP/PEIS. In the vast majority of the scientific references used in this document, the methods used to conduct the research are explained. The studies cited in the references are publicly available and the "explicit documentation of what constitutes [best available science] BAS" would be too extensive to detail in an EIS. However, in numerous places in this Multisale EIS, where it was considered important or when BOEM had derived independent methods for evaluating a resource, these methods are included in the descriptions in the text or specific methodologies were summarized, e.g., the calculation of OCS oil- and gas-related service vessels. BOEM's subject-matter experts have

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			clarified in this Multisale EIS where incomplete or unavailable information may be essential to a reasoned choice among alternatives, if the information could be obtained or, if the costs of obtaining it are exorbitant, and that what scientifically credible information is available was applied using accepted scientific methodologies. BOEM has used the most relevant, up-to-date, and credible science throughout the preparation of this Multisale EIS, including throughout development of the oil and gas hydrocarbon forecasts and activity scenarios. BOEM has presented a robust range to reasonably bound low and high activity levels for each alternative for each proposed lease sale. BOEM does not expect every proposed lease sale to reach the highest high or lowest low of the scenario forecasts but that it will fall within the reasonable range presented in **Tables 3-1 and 3-2**. BOEM continues to pursue and utilize the most relevant, up-to-date and credible science in development of this Final Multisale EIS and subsequent NEPA documents. Please refer to **Chapter 3.0**, which is where we provide information on the science and methods used to develop the scenarios. Each alternative single lease sale scenario is based on (1) recent trends in the amount and location of leasing, exploration, and development activity; (2) estimates of undiscovered, unleased, economically recoverable oil and gas resources in each water-depth category and each planning area; (3) existing offshore and onshore oil and/or gas infrastructure; (4) published data and information; (5) industry information; and (6) oil and gas technologies and the economic considerations and

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			environmental constraints of these technologies. Due to the inherent uncertainties associated with an assessment of undiscovered resources, probabilistic techniques were employed to develop the scenario, and the results are reported as a range of values corresponding to probabilities of occurrence. BOEM used the aforementioned categories to develop a low-activity scenario and a high-activity scenario. The activity level associated with a proposed lease sale is expected to vary based on a number of factors, including the price of oil, resource potential, cost of development, and resource availability (e.g., drill rig availability). BOEM feels the developed ranges provide a reasonable expectation of oil and gas production and associated activity anticipated from a single proposed lease sale.
Restore Mississippi Sound, Sharon Hayes, Director	RMS-2	The EIS also doesn't include reference to the Taylor Energy Spill in the Gulf caused by Hurricane Ivan in 2006. Currently discharges over 90 gallons per day for over 10 years, and there is no end in sight.	Additional information regarding the Taylor Energy platform that was lost during Hurricane Ivan and that was located in Mississippi Canyon Block 20 was incorporated into this Final Multisale EIS (**Chapter 3.2.1.1.3**).
Restore Mississippi Sound, Sharon Hayes, Director	RMS-4	Most recently we have the Shell Oil Spill. This past week observers who flew over the spill believe that it was actually several times larger than originally reported.	Official estimates are currently being investigated by USCG and have yet to be released. The latest available information does not suggest that the size of the Shell oil spill in May 2016 was any larger or smaller than what was originally reported.
Gulf Coast Group of the Mississippi Sierra Club, Steve Shepard, Chair	GCGMSC-1	I am unhappy with the notion of more oil and gas lease sales because of the propensity of oil spills, plus having a spill from 2004, the Taylor Spill, that has not ever been stopped. And I obviously have a fear that as we drill deeper and in more difficult places, that we will be seeing more and more of these spills, which are accumulating and causing our Gulf to lose its previous productivity.	Additional information regarding the Taylor Energy platform that was lost during Hurricane Ivan and that was located in Mississippi Canyon Block 20 was incorporated into this Final Multisale EIS (**Chapter 3.2.1.1.3**). The BSEE and BOEM have worked with USCG under a Unified Command to monitor and respond to discharges from Taylor Energy's Mississippi Canyon Block 20 site since the oil production platform and 25 of the 28 connected wells were impacted and damaged during Hurricane Ivan in 2004. The multi-agency effort has worked

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			continuously to prevent and control oil discharge, to improve the effectiveness of containment around the source of the oil discharge, and to mitigate environmental impacts. The Unified Command's collaborative efforts have resulted in the removal of the platform deck, removal of subsea debris, decommissioning of the oil pipeline, and intervention of 9 of the 25 impacted wells. Taylor Energy, as the responsible party, has a continuing legal obligation and responsibility to pay for oil-spill recovery and response costs under the Oil Pollution Act of 1990. Please refer to the response to Comment MR-1 regarding recent rigorous regulatory requirements both before and after the *Deepwater Horizon* explosion, oil spill, and response, and to Comment SC-5 for information about deepwater drilling.
Yolanda Ferguson	YF-6	If they choose to drill, they have to choose a way to show us how they're not going to make us sick anymore. That's my major concern, how are you going to clean it up?	Oil-spill prevention and response plans are discussed in **Chapter 3.2.8.1.1 and Appendix A.5**, and the discussion of mitigating measures can be found in **Appendix B**. While BOEM discusses oil spills in **Chapter 3.2.1**, a catastrophic oil spill as a result of a blowout is not part of a proposed action nor is it considered likely to occur. BOEM provides an analysis of such a spill in the *Catastrophic Spill Event Analysis* white paper (USDOI, BOEM, 2017). Nevertheless, oil-spill response plan requirements mandate that operators estimate a worst-case discharge scenario and prepare to respond to such a spill even if not reasonably foreseeable.
Yolanda Ferguson	YF-7	You all -- they -- if they were going to -- I want to know who's in charge of the spill. I don't want the spiller in charge of the spill ever again. I don't want someone like BP to write a contingency plan that gives them the power to do what they did ever again. The spiller doesn't need control of the spill.	Please refer to the response to Comment YF-5, and refer to **Chapter 3.2.8.1** for a more detailed discussion of BSEE's spill-response requirements and initiatives. A Federal On-Scene Coordinator (FOSC) is a representative of a Federal agency such as USCG or USEPA. The FOSC oversees the oil-spill
Gulf Restoration	GRN-10	The Coast Guard or U.S. Government should be entirely in control of a cleanup. It should not be the	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Network, Howard Page		corporation that destroyed the water.	response effort and determines if the efforts were conducted in accordance with the National Contingency Plan (USDHS, CG, 2016). The NOAA's Office of Response and Restoration is charged with responding to oil spills, chemical accidents, and other emergencies in coastal areas. Under the National Contingency Plan, NOAA is responsible for providing scientific support to the FOSC for oil and hazardous material spills. To support this mandate, the Office of Response and Restoration provides 24-hour, 7-day-a-week response to spills (USDOC, NOAA, Office of Response and Restoration, 2016).
Gulf Restoration Network, Howard Page	GRN-9	Also more access needs to be given to coverage the these events. The press needs to be given full, unrestricted access to any spill.	BOEM's Office of Public Affairs promotes transparency, responds to all media requests, and provides accurate and timely information on all BOEM-related subjects. The BSEE oversees oil-spill planning and preparedness for U.S. facilities that are located in both State and Federal waters seaward of the coastline and that handle, store, or transport oil. This authority is granted through the Oil Pollution Act of 1990 and Executive Order 12777. All functions related to BSEE's authorities in oil-spill research, planning, preparedness, and response are now handled through the National Oil Spill Program, which is administered by the Oil Spill Preparedness Division. The BSEE makes available to the public the information regarding oil spills, incidents, investigations, and statistics; this information can be found on BSEE's website at http://www.bsee.gov. Refer also to the response to Comment YF-7.
Mississippi Coalition for Vietnamese-American Fisher Folk	MCVAFFF-8	Lastly, we're very, very concerned that our federal and state agencies have not learned to implement the lessons learned and best practices, right. For example, from -- after the Exxon Valdez, you know, oil disaster, the -- in Prince William Sound, they	The Trustees have issued the PDARP/PEIS, and information on the settlement with BP (called the Consent Decree) can be found at http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
and Families, Thao Vu, Director		create a regional citizen advisory council, right. And that's to provide some citizen oversight and monitoring. There is a great, great critical need to implement that -- establish that here for the Gulf -- for the Gulf Coast region, right. And it needs to be implemented now so we can have contingency programs to be able to prepare to -- you know, prepare and respond to other future disasters like the one we just had with Shell last week. Right. That is greatly, greatly needed and -- to have contingency programs in place and to have adequate infrastructure and cleanup workers are properly trained and to be able to respond to that. And we believe that is greatly missing. That needs to be implemented right away. And, in fact, after BP, there was a National Spill Commission. One of their key recommendations was the establishment of this Regional Citizen Advisory Council, and to this day it hasn't been established.	Within the PDARP/PEIS, the Trustees received similar comments calling for a Regional Advisory Council to be established. The Trustees also received a comment that "referenced a report recommending a public advisory committee. That September 2010 report, correctly titled *America's Gulf Coast: A Long-Term Recovery Plan after the* Deepwater Horizon *Oil Spill*, provides recommendations on working with existing Federal and State advisory committees to ensure that relevant scientific and technical knowledge underpins planning but does not have recommendations specific to a citizen's advisory group for the NRDA effort. Within Chapter 8.3 (page 8-109) of the PDARP/PEIS, the Trustees acknowledged the need to more specifically describe the public engagement and transparency that will occur in the restoration planning process, and they believe that the additional engagement and transparency steps described in Sections 7.3 and 7.7 of the PDARP/PEIS, and in response to Comments 7-28 and 7-29 on the PDARP/PEIS, meet the current needs for public engagement and involvement without formal development of a Regional Citizens Advisory Group. Public dialogue and comment will be possible during an annual Trustee Council meeting and annual Trustee Implementation Group (TIG) meetings that will be open to the public. The Trustees will also engage the public and maintain transparency of the restoration planning process by accepting public submittal of project ideas, providing the public with a description of what Restoration Type(s) each TIG will focus on over a specified timeframe, providing public review and comment on each restoration plan, including opportunities for

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			public engagement during draft restoration plan meetings. Further, the Trustees are committed to a transparent restoration planning process and will ensure that information is shared in a timely manner related to restoration planning milestones, project reporting, and monitoring data aggregation through the use of the Trustee Council website; TIG websites; the DIVER Restoration Management Portal; and focused press releases, email blasts, and/or text messages, although the exact means will likely vary by TIG. Additional details of the public engagement and transparency steps have been included in Sections 7.3 and 7.7 to provide clarifying information in the Final PDARP/PEIS. More specific details will be further described in the Trustee Council's Standard Operating Procedures and any subsequent Standard Operating Procedures for a given TIG. Refer to **Chapter 3.2.8.3** for more information on Area Contingency Plans (ACPs). The ACPs cover subregional geographic areas and represent the third tier of the National Response Planning System mandated by the Oil Pollution Act of 1990. The ACPs are a focal point of response planning, providing detailed information on response procedures, priorities, and appropriate countermeasures. The USCG has worked diligently to improve coastal oil-spill response since the *Deepwater Horizon* oil spill by improving the ACPs for each coastal USCG sector. The GOM coastal area that falls within USCG's 8th District is covered by ACPs for areas covered by USCG Sector Corpus Christi, Sector Houston/Galveston, Sector Port Arthur, Sector Morgan City, Sector New Orleans, and Sector Mobile. The ACPs from USCG's 7th District cover the remaining GOM coastal area.

Table L-1.	Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Apalachicola Riverkeeper	AR-1	The method and data BOEM used in developing the document includes flawed assumptions about: 1) the degree of impacts, 2) the accuracy in reporting of volume and range of impacts, and 3) the life or duration of the impacts that result from spills. These assumptions provide an over estimation of the benefits without assessing the real costs of the impact. We know that the estimates of past OCS Spills is built on inaccurate and often unreported incidents and spills which grossly underestimates the volume of contaminants leaked and the probable impacts that result from them. BOEM also assumes that certain incidents have a low potential of recurring, when in fact the potential is unknown or much higher. For example the Deep Water Horizon spill is viewed as unlikely to reoccur when in all probability as exploration into deeper water and wells occur, the risk increase with a greater probability of occurring. Realistic evaluations and a new analysis should be undertaken.	Specifically, per 30 CFR § 250.187 and 30 CFR § 254.46(a), operators are required to immediately report to BSEE all spills of oil or other liquid pollutants that are known or suspected to be 1 bbl in volume or greater. This requirement is in addition to, but does not substitute for, the National Response Center's reporting requirements. Per 30 CFR § 254.46(b)(2), spills >50 bbl in volume require more detailed reporting and monitoring, and such spills trigger greater investigative response by BSEE, which may require the operator to submit additional information about the response. These reports of historical spills help form the basis of the range of spills that may be reasonably foreseeable as a result of a proposed lease sale. For information related to the probability of a catastrophic spill occurring, please refer to the response to Comment CBD, BL, GRN, LBB, RAHC-4.
John Kersting	JK-2	Exploration, drilling, and transportation raise the risks of catastrophic oil spills, and expose our air, water, and wildlife to significant amounts of pollution. There have been 40 large oil spills (greater than 42,000 gallons) since 1964, but smaller spills occur on a daily basis. In the past 45 years, BOEM estimates that more than 500,000 barrels of oil have leaked, unreported, into American waters.	Thank you for your comment. Please see the responses to Comments CBD, BL, GRN, LBB, RAHC-8 and SC-6.
Ronald Kardos	RK-2	The potential for leaks is too risky and there is no adequate way to monitor for leaks in this environment. The damage done to the fragile ecosystem during construction and forever after is inestimable. Although the Flower Banks Marine Sanctuary will not be sold for the highest bidder, there is a potential for damage to it. Here is just one example of the dangers of offshore drilling (a Taylor Energy Company owned platform	Please refer to **Chapter 3.2.1** for more information on oil-spill risk assessment. BOEM considered and eliminated an alternative excluding the Flower Garden Banks National Marine Sanctuary in **Chapter 2.2.3**. BOEM included information on the Taylor platform leak in **Chapter 3.2.1.1.3**.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		that has been leaking since 2004): http://www. nola.com/environment/index .ssf/2015/04/gulf_ oil_spill_hidden_2004. html	
Topic 7 – Mitigation			
State of Louisiana Department of Natural Resources (LADNR), Don Haydel, Acting Administrator Interagency Affairs/Field	LADNR-3	In a broader sense, it is of concern to OCM that the responsibility within BOEM for compensatory mitigation appears to be unclear. The DEIS states that this responsibility lies with unspecified "program offices" at Headquarters level: Program and Policy Issues: Comments and concerns that relate to program and policy are issues under the direction of the U.S. Department of the Interior and/or BOEM's guiding regulations, statutes and laws. The [scoping] comments and concerns related to program and policy issues are not considered to be specifically related to the proposed actions. For example, the Louisiana Department of Natural Resources, Office of Coastal Management requested in their scoping comments that this Multisale EIS make provisions for compensatory mitigation for all lease sale impacts. Such comments are forwarded to the appropriate program offices for their consideration. Programmatic issues … have been considered in the preparation of the Draft Five-Year Program EIS. (DEIS page 2-32). However, the Outer Continental Shelf Oil and Gas Leasing Program: 2017-2022 Draft Programmatic Environmental Impact Statement, prepared by BOEM's Headquarters office, places the responsibility for compensatory mitigation at the Gulf of Mexico Region level: "Appropriately scaled analyses at these later decisions for leasing, exploration, development, and production can best identify specific mitigation measures, including required compensatory mitigation measures" (pg. 1-8). Once again, OCM strongly urges BOEM to accept the responsibility to identify and quantify the accumulating coastal impacts of OCS lease sales to Louisiana, and provide appropriate compensatory	BOEM recognizes the apparent, but unintended, contradiction in statements on compensatory mitigation in the Draft Multisale EIS and Draft Five-Year Program EIS. BOEM is in the process of developing a compensatory mitigation program to determine how and at what stage(s) it could be applied to BOEM-regulated activities. The information provided in the Five-Year Program EIS is intended to provide a high-level overview of how BOEM could use a landscape-level approach to planning and mitigating impacts, including implementation of the full mitigation hierarchy.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		habitat mitigation.	
Alabama Historical Commission, Lee Anne Wofford	AHC-1	Upon review of the above referenced project, we request that a professional maritime archeologist meeting the DOI's professional standards complete a maritime archeological survey of the project areas to identify any cultural resources that may be present. The survey should conform to Alabama's Standards for Submerged Cultural Resource Survey as provided. Submit the resulting report to our office for review and determination prior to construction activities.	Section 106 reviews of proposed actions are conducted by BOEM's staff of professional marine archaeologists as part of the environmental reviews conducted for postlease activities. These reviews are based, in part, upon data collected by remote-sensing (i.e., magnetometer, side-scan sonar, and subbottom profiler) surveys conducted on behalf of the individual lease operators. The surveys are reviewed and reported on by their contracted archaeologists, with the reports submitted to BOEM. Approximately 200 such reports are received and reviewed each year. The archaeologists preparing the reports for submittal to BOEM meet the National Park Service's guidelines for professional archaeologists. Surveys typically cover an operator's 9-mi^2 (23-km^2) lease block, but the surveys may extend to cover multiple blocks, especially in very deep water. These are not likely to occur for years after any one individual lease sale. The technical requirements of the archaeological resource reports are detailed in NTL 2005-G07, "Archaeological Resource Surveys and Reports." Under 30 CFR § 550.194(c) and 30 CFR § 250.1010(c), lessees are required to notify BOEM and BSEE immediately of the discovery of any potential archaeological resources. BOEM is committed to consulting with the Alabama Historical Commission regarding the potential impacts to submerged cultural heritage of interest located off the coast of Alabama. However, given regulatory due dates imposed by the OCSLA and the volume of applications processed by this office each year (in the hundreds), it is our belief that it is not practical to consult on each individual action within the GOM if the potential resource can be avoided. We

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			recommend, instead, initiating consultation in the event that a resource has been found to be significant and cannot be avoided. BOEM's staff is amenable to a follow-up conversation that explains the process more fully and to explain the archaeological survey procedures and standard mitigations that are employed to ensure historic properties on the OCS are not affected by offshore energy development.
Alabama Department of Environmental Management (ADEM), Anthony Scott Hughes, Chief	ADEM 1	The ADEM supports the leasing of any unleased blocks in the Gulf of Mexico with the exception of those blocks which are located within the 15 miles of the Baldwin County, Alabama coastline. Alabama's Governors have consistently opposed the sale of these leases. IN addition, the ADEM requests BOEM require adequate protection for the live bottom areas, pinnacle reefs, chemosynthetic communities, and other sensitive environments in the OCS off Alabama's coast.	As noted in ADEM's letter, the Governors of Alabama have historically indicated opposition to new leasing south and within 15 mi (24 km) of Baldwin County; however, they have requested that, if the area is offered for lease, a lease stipulation to reduce the potential for visual impacts should be applied to all new leases in this area. Protective measures are in place to mitigate the potential impacts to the areas south of Baldwin County and to the biologically significant bottom-founded marine communities and archeological resources. Coordination requirements are described in the Blocks South of Baldwin County, Alabama and Topographic Features Stipulations (which can be found in **Appendix D**), and the resource analyses in **Chapter 4**. In addition, during postlease reviews, BOEM and BSEE have a suite of mitigations that are included as conditions of approval, as the site specific conditions warrant. Examples of such relevant postlease mitigations might include, but is not limited to, prohibiting discharges near sensitive live bottom habitats (e.g., chemosynthetic communities), anchoring restrictions, distancing requirements, ROV surveys. **Appendix B** provides more detail on the suite of applicable mitigations that could be applied to protect the areas of concern presented in your comment.
United States Environmental	USEPA-4	EPA has noted in several past EISs that coastal wetland systems in the Gulf of Mexico are very	In order to clarify the basis for negligible impacts, BOEM projects that the majority of new pipelines

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Protection Agency		sensitive systems that are increasingly stressed from all types of activities including but not limited to coastal development, maintenance dredging of channels, and oil and gas development. These systems are also stressed due to natural events such as hurricanes. Stresses on these systems are only predicted to increase with climate change and sea level rise. A report by Stedman and Dahl (2008) on the status and trends of wetlands in coastal watersheds states that the "Gulf of Mexico coastal watersheds exhibited substantial losses in freshwater wetlands. This rate of loss was 6 times higher than the rate of freshwater vegetated wetlands losses in the Atlantic coastal watersheds. The estimated losses for all wetland types in the Gulf of Mexico were 25 times higher than those estimates for the Atlantic over the course of this study." This report also indicates that coastal areas along the panhandle of Florida, Alabama, Mississippi, Louisiana, and Texas are listed as areas of greatest coastal wetland loss in the Gulf of Mexico and that a "majority of the coastal wetland loss (61,800 acres per year) from 1998 to 2004 occurred in the Gulf of Mexico." EPA notes BOEM's efforts to better quantify historical wetland losses for coastal areas in the Gulf of Mexico, the inclusion of State specific information on the status and trends of coastal wetland systems in Chapter 4 of the EIS, and the evaluation of several recent studies looking at the impacts of the Deepwater Horizon spill on these coastal systems. In Section 4.3.1 Estuarine Systems (Wetlands and Seagrass/Submerged Vegetation), Table 4-4 identifies routine impacts as negligible for pipeline construction and maintenance, navigation channel maintenance dredging, vessel operation, disposal of	constructed as a result of a proposed action would connect to the existing pipeline infrastructure offshore; therefore, there would be no coastal and wetland impacts from pipeline landfalls. In the rare instance that a new pipeline to shore would need to be constructed, it would likely be because there are no existing pipelines reasonably close and because constructing a pipeline to shore is considered more cost effective, although it is highly unlikely for an operator to choose this contingency (Dismukes, official communication, 2011). BOEM anticipates that pipelines from most of the new offshore production facilities would tie into the existing pipeline infrastructure offshore or in State waters, which would result in few new pipeline landfalls (page 3-42 of the Draft Multisale EIS). Impacts are deemed negligible due primarily to the fact that only 0-1 pipeline landfalls are projected with a proposed action. In addition, the 12- to 20-ac (5- to 8-ha) estimate represents the impact that could occur without mitigation. In practice, it would likely be an overestimate, given current regulatory policies of COE and the Gulf Coast States. As stated in the Draft Multisale EIS, this estimate does not take into account mitigating measures from the present regulatory programs of Federal or State agencies, modern installation techniques, and the Federal "no net loss" policy. These programs and techniques include compensatory mitigations and less destructive construction methods. BOEM has no regulatory authority over wetland mitigation and cannot commit to the implementation of mitigating measures for wetlands impacts. BOEM's authority is generally limited to oil and gas activities on the OCS. However, such authority is enforceable through the Clean Water Act and the Coastal Zone Management Act. BOEM prepares

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		OCS oil- and gas-related wastes, and construction and use of coastal support infrastructure under Alternatives A, B, C and D. However, on page 4-56 and 4-57, the DEIS states that one (1) pipeline construction resulting in12-20 acres of 'land loss' is expected without modern techniques (e.g., trenchless construction) or mitigation. It is unclear how the impacts are deemed negligible. Trenchless or modem techniques are only required for 'crossing barrier island and shore faces', and the expected impact is negligible. The DEIS identifies access and staging areas for trenchless construction will entail impacts. The Lease Stipulations in Appendix D and the discussions in Section 2.2.4 (Mitigation Measures) does not discuss the requirement to use modern techniques for new pipeline construction. Additionally, Appendix B mitigation measures for pipelines relates solely to deep water construction and does not indicate any measures required for pipelines in coastal habitat. Further, it appears the DEIS does not fully evaluate new pipeline construction for more inland coastal habitats and wetlands. *Recommendation:* EPA recommends the FEIS clarify how the pipeline construction and operation mitigation measures required of lease operators will be enforceable. We recommend the FEIS commit to implementation of mitigation measures for all pipeline construction and operations activities in coastal habitats. EPA recommends the FEIS clarify the basis of negligible impact for pipeline construction and maintenance.	Coastal Zone Consistency Determinations to the individual states regarding lease sales. Additionally, BSEE does not approve pipeline right-of-way applications that traverse the OCS to State submerged lands until the corresponding permits from the State and COE have been reviewed and approved. Given Federal and State requirements regarding construction in the coastal zone and wetlands, we expect any related State and Federal permit to include enforceable mitigation requirements.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
United States Environmental Protection Agency	USEPA-7	On page 4-59 under Onshore Facilities, the DEIS states that all new facilities attributed to the OCS Program are described in Section 3.1.7 Coastal Instructure, which included 0 - 1 gas processing plant. Also, it states any large construction project in the coastal zone is likely to impact some wetland acreage, and any impacts upon wetlands are mitigated in accordance with the Clean Water Act requirements, Corps of Engineers' 404 Permit, and State permitting requirements. Further, the DEIS states that since no new facilities are estimated with the proposed action and any possible impacts would be mitigated, the impact would be negligible. On page 4-66 under Coastal Infrastructure and Pipelines, the DEIS states activities that would further contribute to wetland loss include additional construction of access channels to shoreline staging areas and expansion of onshore and offshore facilities. It further projects 0-1 new gas processing facility and 0-1 new pipeline landfall. The DEIS identifies that if a new facility is constructed and a pipeline makes landfall, any impacts to wetlands would be mitigated. Thus, it appears BOEM is relying on mitigation under the Clean Water act requirements, Corp. of Engineers' 404 Permit, and State permitting programs for any potential reduction or mitigation of impacts. Also, it is appears the DEIS has conflicting statements on whether new facilities are included with the proposed project. Please clarify in the final EIS.	It is correct that BOEM is relying on mitigating measures typically required under the Clean Water Act's requirements, COE's 404 Permit, and State-permitting programs for any potential reduction or avoidance of impacts. BOEM has no authority to enforce mitigation for wetland impacts, and there is no known footprint for construction at this stage of prelease impact assessment. No new facilities are expected to be constructed as a result of any alternative of a proposed action (page 3-78 of the Draft Multisale EIS). However, BOEM acknowledges that the possibility still exists that a company would decide to construct a facility and, if it supported OCS oil- and gas-related activity, it would likely be placed in the coastal zone and wetland impacts could result. That is why such potential impacts are discussed in this Multisale EIS. Therefore, BOEM projects 0-1 gas processing plants because BOEM makes conservative infrastructure scenario estimates; nevertheless, the projection of between 0 and 1 is more likely to be 0 than 1 (page 3-86 of the Draft Multisale EIS).
United States Environmental Protection Agency	USEPA-11	In Sections 2.2.4.2 Pre-lease Mitigating Measures by Alternative and 2.2.4.3 Post-lease Mitigating Measures, the DEIS discusses mitigating measures that could be applied at the prelease stage and during site-specific plan and/or permit reviews. Further, Appendix B identifies commonly applied mitigating measures that could apply. Specific	In **Chapter 2.2.4.1**, BOEM defines all prelease mitigating measures (stipulations) analyzed in this Multisale EIS and identifies which stipulations are applicable to which alternative in **Table 2-1**. **Appendix B** provides definitions of all commonly applied postlease mitigating measures.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		measures were not identified. *Recommendation:* EPA recommends the FEIS clarify the specific mitigation measures and incorporate a commitment to implement mitigation measures selected to reduce or avoid any adverse impacts from the proposed project.	The Topographic Features and Live Bottom (Pinnacle Trend) Stipulations have been applied as programmatic mitigation in the Five-Year Program EIS (USDOI, BOEM, 201a) and therefore, would apply to all leases issued under the Five-Year Program in designated lease blocks. The analysis of the other eight stipulations for any particular alternative does not ensure that the Assistant Secretary for Land and Minerals Management 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 prelease mitigating measures are disclosed in the Record of Decision for that particular lease sale. Those stipulations become enforceable provisions of the lease and are enforced by BSEE through their rigorous inspection program. Postlease mitigating measures are implemented on a case-by-case basis throughout the postlease process through site-specific plan and/or permit reviews and cannot be speculated on at this point in the program. **Appendix A** provides detailed information on BOEM's and BSEE's postlease permitting and approval processes.
Topic 8 – Regulations and Safety			
ConocoPhillips , Richard Lunam, VP E&P, North America Exploration	CP-3	These efforts between the oil and gas industry and governmental agencies have built a stronger offshore safety culture. With increasing experience and strong processes in place, the nation stands to benefit tremendously from increased Gulf of Mexico exploration and development.	Thank you for your comment.
American Petroleum Institute (API),	API-3	As part of the EIS analysis, BOEM must also consider the extensive safety improvements implemented by the industry and the new	Thank you for your comment. In response to the *Deepwater Horizon* explosion and oil spill in the Gulf of Mexico in 2010, DOI launched the most

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Andy Radford		requirements imposed on offshore operations since the Deepwater Horizon incident. Throughout the scoping and development of the EIS, BOEM must remember that history indicates the possibility of a catastrophic oil spill remains a very low probability. With the implementation of the new drilling and environmental safeguards adopted by industry, the probability of a catastrophic spill will be reduced even further. In addition, the formation of well containment companies and their ability to assist in the response to any future incidents must be considered.	aggressive and comprehensive reforms to offshore oil and gas regulation and oversight in U.S. history (USDOI, BSEE, 2016). The DOI has implemented a suite of regulatory changes following the *Deepwater Horizon* explosion, oil spill, and response. These changes are discussed in detail in **Chapter 3.2 and Appendix A**. As noted throughout this Multisale EIS, a catastrophic event like the *Deepwater Horizon* explosion, oil spill, and response is not considered reasonably foreseeable as a result of a proposed action. The key to managing the risk of such an event is to implement a rigorous regulatory regime to ensure that postlease drilling activities are conducted in a safe manner. It is at this stage that detailed information regarding a specific proposed action is available for review, including reservoir characteristics, infrastructure designs, and features to ensure safety and reduce environmental risk. For an analysis of reasonably foreseeable impacts associated with a low-probability catastrophic spill, such as the *Deepwater Horizon* explosion and oil spill, please refer to the *Catastrophic Spill Event Analysis* white paper (USDOI, BOEM, 2017). Furthermore, as stated in **Appendix A.11**, to assure that oil and gas exploration, development, and production activities on the OCS are conducted in a safe and environmentally sound manner, 43 U.S.C. § 1347(b) of the OCSLA, as amended, requires that all OCS technologies and operations use the best available and safest technology whenever practical. BOEM's analysis in this Multisale EIS acknowledges the risks of accidental spills and events, even in light of the rigorous safety regulations in place. These are identified and the potential impact-producing
Harriett E. Myers	HM-1	I believe there is no way to 100% prevent fires, spills or collapses; and I believe the nature of business is to take risks. Also, I believe current regulations are weak.	
Jack Radosta	JR-1	I implore the power that be to put a moratorium on all drilling unless it is 100% failsafe.	
Renate Heurich	RH-3	I feel even with the improved regulations, there is still a huge risk of extreme accidents, and we know the impact of the Deepwater Horizon spill are still around. I just – I have tarballs here that I could show you that were just collected last month on Elmer's Island. They're all over the place. These tarballs, when you break them open, they contain flesh-eating bacteria, so we'll be fooling with dangerous stuff. And we don't even know, you know, what's still going on at the bottom of the Gulf because that's an area where it's hard to explore, but there are resources. There are large mats of oil and we -- I'm afraid to see how it is going to affect the environment and fisheries in the long-term.	
Maxine Ramsay	MR-1	In this here problem -- and we see it as a problem -- why should we believe any gas or oil drilling in the Gulf will be safe?	
Yolanda Ferguson	YF-3	The deepwater drilling, it -- it's been -- we've had this before, and it was disastrous results. Have you all changed your itinerary on cleaning up?	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			factors as a result of an event are described in **Chapter 3.2**. Potential impacts from these activities are analyzed in each resource chapter in **Chapter 4**. Nevertheless, BOEM acknowledges that, even with the stringent standards, risk is not wholly eliminated. For example, **Table 3-17** acknowledges that, even with application of these standards, certain small spills (≥1.000 bbl) may be reasonably foreseeable. BOEM/BSEE are constantly evaluating and responding to potential risks through strengthening enforcement and inspection, and continually updating regulatory requirements.
Cyrus Reed	CR-8	And if we are going to allow oil and gas drilling, I sure want there to be good rules in place so that we're not allowing fugitive emissions of things, and there should be a good leak detection and repair program for all offshore equipment and rigs. So, I would want to make sure that was in place.	Thank you for your comment. A description of the air emissions' regulations and jurisdiction, and fugitive emissions can be found in **Chapter 3.1.8**. Please refer to **Chapter 4.1** for the impacts of a proposed action to air quality.
Yolanda Ferguson	YF-4	I say, do you -- do they -- do they have a requirement where they go back and they have to recheck all these wells that they have leased over a certain amount of time? Your website said it's 10 years. Can you tell me if there is somebody that goes back out and rechecks all these leases? You all have got these little blocks to say where you leased them. Does anybody go out there and recheck these leases? I mean, you -- you're giving all these leases off, leases like a piece of property and it sits there empty.	Thank you for your comment. A lease conveys the right to explore for, develop, and produce the oil and gas contained within the lease area. Leases are offered as blocks that are 9 mi^2 (3 mi on a side). An oil and natural gas lease grants the exclusive right to explore for, develop, and produce oil and/or natural gas for a specific initial period (minimum of 5 and maximum of 10 years) from a specific block of OCS land. All plans for OCS oil- and gas-related activities (e.g., exploration and development plans) go through rigorous BOEM review and approval to ensure compliance with established laws and regulations before any project-specific activities can begin on a lease. The OCSLA authorizes and requires BSEE to provide for both an annual scheduled inspection and a periodic unscheduled (unannounced) inspection of all oil and gas operations on the OCS. **Appendix A.4** discusses inspection and enforcement of ongoing oil and gas

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			activities. While the Gulf of Mexico has a mature OCS oil and gas leasing program, it is a huge area and there remain unleased blocks and interest in exploring new and previously leased blocks.
Yolanda Ferguson	YF-5	It says -- it's like they like – you wonder because if you're out there, do they have a contingency plan? We're -- you know, to clean this mess up. What's going to happen the next oil spill? That's my major concern. How are you going to clean this up? Where do we go to do the checks and balances to find out how you're going to go about what happens in the next spill?	As a result of the Oil Pollution Act of 1990 and the reorganization of the Bureau of Ocean Energy Management, Regulation and Enforcement into BOEM and BSEE, BSEE was tasked with a number of oil-spill response duties and planning requirements. Within BSEE, the Oil Spill Preparedness Division addresses all aspects of offshore oil-spill planning, preparedness, and response. Additional information about the Oil Spill Preparedness Division can be found on BSEE's website at http://www.bsee.gov/About-BSEE/Divisions/OSPD/index/. Please refer to **Chapter 3.2.8.1** for a more detailed discussion of BSEE's spill-response requirements and initiatives. The responsible party for covered offshore facilities must demonstrate oil-spill financial responsibility, as required by 30 CFR part 553. These regulations implement the oil-spill financial responsibility requirements of Title I of the Oil Pollution Act of 1990, as amended. Penalties for noncompliance with these requirements are covered at 30 CFR § 553.51 and in NTL 2008-N05, "Guidelines for Oil Spill Financial Responsibility for Covered Facilities." A covered offshore facility, as defined in 30 CFR § 553.3, is any structure and all of its components (including wells completed at the structure and the associated pipelines), equipment, pipeline, or device (other than a vessel or other than a pipeline or deepwater port licensed under the Deepwater Port Act of 1974) used for exploring, drilling, or producing oil, or for transporting oil from such facilities. The

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			BSEE ensures that each responsible party has sufficient funds for removal costs and damages resulting from the accidental release of liquid hydrocarbons into the environment for which the responsible party is liable. More information on oil-spill response plan regulations and processes can be found in **Appendix A.5**.
Gulf Restoration Network, Howard Page	GRN-6	[…] then also a real look at improved safety on the rigs.	The BSEE promotes compliance with safety and environmental standards through regular inspections and other monitoring activities, timely notice to operators of detected violations, clear direction for coming into compliance, and a reasonable opportunity for improvement. The BSEE's intent is to prevent incidents; however, should they occur, BSEE has a duty to investigate, to determine the causal elements/factors, and to take the appropriate corrective actions. Refer to **Appendix A.4** for more information on BSEE's inspection and enforcement responsibilities, as authorized by the OCSLA, and to the response to Comment API-3 for more information on regulatory changes since the *Deepwater Horizon* explosion, oil spill, and response.
Gulf Restoration Network, Howard Page	GRN-7	There needs to be better monitoring of the pipelines to find the leaks in real time.	Thank you for your comment. Operators are required to periodically inspect pipeline routes. Monthly overflights are conducted to inspect pipeline routes for leakage. When a pipeline requires a repair, a repair plan notification and repair completion report must be submitted to BSEE for review and acceptance. Refer to **Appendix A.3** for more information.
Gulf Restoration Network, Howard Page	GRN-8	So, again, much better emergency response plans need to happen with real assets that are really available, not just a few boom ships.	The BSEE oversees oil-spill planning and preparedness for U.S. facilities that are located in both State and Federal waters seaward of the coastline and that handle, store, or transport oil. This authority is granted through the Oil Pollution Act of 1990 and Executive Order 12777. All functions related to BSEE's authorities in oil-spill
Apalachicola Riverkeeper	AR-5	In addition to avoiding impacts by making the development of oil resources more safe and	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		sustainable by designing for all classes of hurricanes, mudslides, and other natural events known to be likely to occur, BOEM could improve spill response and clean up requirements. Experience has shown that clean-up and spill response is ineffective and often unsuccessful for small spills, such as the Taylor Oil spill going on 10 years leaking with no end in sight, much less catastrophic spills such as Deep Water Horizon. Vastly improved response and clean up seem reasonable and logical if our goal is to recover the health and productivity of the Gulf of Mexico and must be developed and implemented before additional leases are considered.	research, planning, preparedness, and response are now handled through the National Oil Spill Program, which is administered by the Oil Spill Preparedness Division. This Division addresses all aspects of offshore oil-spill planning, preparedness, and response. Additional information about the Oil Spill Preparedness Division can be found on BSEE's website at http://www.bsee.gov/About-BSEE/Divisions/OSPD/index/. Refer to **Chapter 3.2.8.1** for a more detailed discussion of BSEE's spill response requirements and initiatives, to the response to Comment SC-11 for more information on oil-spill response plans, and **Appendix A.5** for additional information.
United States Environmental Protection Agency	USEPA-2	The DEIS states that the Bureau of Safety and Environmental Environment (BSEE) "performs NP DES inspection on behalf of the USEPA for production platforms and drilling rigs though a 1984 Memorandum of Understanding between the U.S. Department of the Interior, the USEPA, and the U.S. Department of Transportation (USDOI, MMS, 1983) and a 1989 Memorandum of Agreement between MMS (BSEE predecessor) and the USEPA Region 6 (USDOI, MMS, 1989)." *Seep.* 3-55. Also, it states that "Produced water may be discharged if the oil and grease concentration does not exceed 42 milligrams per liter (mg/L) daily or 29 mg/L monthly average. The discharge must also be tested for toxicity." *See* p. 3-61. *Recommendation:* EPA recommends the statement referenced on page 3-55 start with "BSEE performs NPDES inspections on behalf of USEPA Region 6 for production facilities ..... " It is later clarified that BSEE only conducts NPDES inspections in Region 6 jurisdictional waters, however to make this more clear, the above text is	BOEM thanks USEPA for their comment. The suggested additional language was added to **Chapter 3.1.5.1**.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		recommended. We recommend the above text on page 3-61 include a statement that toxicity is primarily for chronic exposure but can include acute exposure.	
John Young	JY-4	Has the BSEE implemented the proposed "well control rule" to significantly strengthen safety of drilling and development against BP Deepwater Horizon type blowout disasters? [See "Protect Our \Miters from Oil Disasters," Gulf Restoration Network .03-22-2016, http:l/healthygulf.org/protect-our-waters-oi l-disasters/]	Thank you for your comment. BSEE implemented the new well control rule "Oil and Gas and Sulfur Operations in the Outer Continental Shelf-Blowout Preventer Systems and Well Control" in 2016. The final rule is codified at 30 CFR part 250.
Topic 9 – Statutory Compliance			
American Petroleum Institute (API), Andy Radford	API-7	On p. v of the DEIS, BOEM should replace the phrase "requiring an EIS" with "requiring environmental review under the National Environmental Policy Act ("NEPA")." Leasing, developing, and producing oil and gas resources on the (OCS) under the OCS Lands Act ("OCSLA") is a staged decision-making process. See e.g., Native Village of Point Hope v. Jewell, 740 F.3d 489, 493 (9th Cir. 2014). Because issuing OCS leases does not involve an irretrievable commitment of resources to any action with significant environmental consequences, NEPA does not compel the preparation of an EIS. Cf. Sec'y of the Interior v. California, 464 U.S. 312 (1984); Native Village of Point Hope, 740 F.3d at 493; Connor v. Burford, 863 F.2d 1521 (9th Cir. 1988). Though BOEM traditionally has prepared an EIS for OCS lease sales, BOEM need not make unnecessarily broad statements.	Thank you for your comment. While this language does not appear on page v, the text has been clarified in **Chapter 1**.
Care2Petition	Care2Petition-1	Any new oil development must follow through on President Obama's promise to "change the way we manage our oil and coal resources so that they better reflect the costs they impose on taxpayers and our planet." It's time to more appropriately balance the	Thank you for your comment. During preparation of this Multisale EIS, BOEM was working under President Obama's *The All-of-the-Above Energy Strategy as a Path to Sustainable Economic Growth* (All-of-the-Above Energy Strategy) (The White

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		needs of the environment, the coast, the climate and our communities your current assessments fail to do this. Cancel these lease sales now!	House, 2014), which has three main goals: to support economic growth and job creation; to enhance energy security; and to deploy low-carbon energy technologies and lay the foundation for a clean energy future. According to that plan, oil and natural gas supplies are integral to meeting national energy demand. For more information, please refer to The White House's website (The White House, 2014). This plan also aligns with President Trump's America First Energy Plan, which calls for energy policies that stimulate our economy, ensure our security, and protect our health. For more information, please refer to The White House's website (The White House, 2017).
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Attorney	CBD, BL, GRN, LBB, RAHC-2	BOEM's Area-Wide Lease Sale Approach Violates OCSLA: As courts have made clear, OCSLA's procedures for authorizing oil and gas activities on the OCS "are pyramidic in structure, proceeding from broad-based planning to an increasingly narrower focus as actual development grows more imminent." Thus, the first stage—the fiveyear planning stage—has "important practical and legal significance," including its role as the basis for "future planning." As such, Section 18(a) expressly requires BOEM to prepare a leasing program that consists "of a schedule of proposed lease sales indicating, as precisely as possible, the size, timing, and location of leasing activity." But rather than "precisely" defining the location of lease sales, BOEM's Proposed Program takes an area-wide approach that designates the entire Gulf of Mexico as the area eligible for lease sales. This area-wide lease sale approach is incompatible with OCSLA. Indeed, under this approach, BOEM is allowing the oil industry to determine which areas are explored and developed, thereby abdicating the agency's	The OCSLA provides the Congressional mandate for BOEM to make "available for expeditious and orderly development, subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs" the land of the Federal OCS. The Secretary of the Interior oversees the OCS oil and gas program and is required to balance orderly resource development with protection of the human, marine, and coastal environments while simultaneously ensuring that the public receives an equitable return for these resources and that free-market competition is maintained. It is during this national-level review that the location (GOM regionwide leasing) and timing of lease sales (number of lease sales per year) is set in the schedule of proposed lease sales. The Five-Year Program EIS analyzes the environmental impacts of the entire 10 lease sale program in the Gulf of Mexico. The regional-level NEPA analysis covered in this Multisale EIS provides a regional-level analysis of the environmental impacts of a single proposed lease

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		responsibility under OCSLA to direct oil activities and assure that they do not cause environmental harm. BOEM's area-wide lease sale approach is particularly troubling considering that this approach has been cited as one of the problems in the offshore oil regime that led to the Deepwater Horizon oil spill. In response to the spill, President Obama established the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling ("Commission") as an independent, nonpartisan entity charged with providing a thorough analysis of the causes of the disaster and recommending reforms for making offshore drilling safer. The Commission issued its final report in January 2011, in which it highlighted the need for a fundamentally different approach to management of offshore drilling. The Commission noted that the areawide approach favored industry at the cost of meaningful environmental analysis. According to the Commission: the disaster and recommending reforms for making offshore drilling safer. The Commission issued its final report in January 2011, in which it highlighted the need for a fundamentally different approach to management of offshore drilling. The Commission noted that the areawide approach favored industry at the cost of meaningful environmental analysis. According to the Commission: OCS lease sales cover such large geographic areas that meaningful NEPA review is difficult. A decision to dramatically increase the size of lease sales—known as area-wide leasing—was made over 20 years ago at the request of industry; it has necessitated environmental analyses of very large areas at the lease sale stage. For example, the Final Environmental Impact Statement for the 2007–2012 multilease sales in the Gulf of Mexico covered more than 87 million acres, while the Final Environmental Impact Statement for Chukchi Sea	sale in the Five-Year Program. Therefore, the analysis in this Multisale EIS evaluates a smaller action consistent with the OCSLA's pyramidal structure. Pursuant to NEPA, this Multisale EIS analyzes a range of alternatives, but NEPA does not require carrying all alternatives considered through a full analysis of impacts. BOEM has ensured that a reasonable range of alternatives to a proposed action, within the framework of the Five-Year Program, has been considered in this Multisale EIS. **Chapter 2.2.3** discusses additional alternatives considered but eliminated them based on the best available information currently available. As noted in **Chapter 1.3.1.2**, any individual lease sale could still be scaled back during the prelease sale process to offer a smaller area should circumstances warrant. Additionally, the issuance of leases does not conclude the environmental analysis of planned OCS oil- and gas-related activities. Each plan throughout the exploration, production, and decommissioning processes receives a site-specific environmental analysis pursuant to NEPA and the OCSLA's pyramidal structure going from large scale to site specific. For more information on BOEM's postlease processes, please refer to **Appendix A**. As suggested in the Commission's final report, BOEM (along with BSEE) has implemented many fundamental changes to improve the management of offshore leasing and drilling. Some of the changes made since 2010 include the following: an Investigations and Review Unit was instituted to root out problems within the regulatory agencies and target companies that aim to game the system; BOEM created multiple Implementation Teams, tasked with analyzing various aspects of BOEM's regulatory structure and helping to implement the reform agenda; BOEM implemented a recusal policy

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Lease Sale 193 covered about 34 million acres. Given that 2008 lease sales in the Central Gulf of Mexico and the Chukchi Sea attracted almost $3.7 billion and almost $2.7 billion in high bids, respectively, it is appropriate to conduct environmental reviews on a finer geographic scale before private-sector commitments of this magnitude are made to purchase leases. However, BOEM's current proposal does just the opposite. In fact, it backslides from prior programs with respect to lease sales in the Gulf of Mexico. While previous programs have established lease sales based on the three separate planning areas—the Western Gulf, the Central Gulf and the Eastern Gulf—BOEM is now proposing to hold two lease sales per year in unleased portions of the "Gulf of Mexico." But the Gulf of Mexico contains nearly 160 million acres, more than 70 million of which are currently unleased and available for lease under BOEM's proposal. The Gulf also contains a great diversity of environmental and socioeconomic characteristics. For example, as BOEM has repeatedly admitted, the separate regions in the Gulf of Mexico have distinct ecological features. The Western Region "hosts the northernmost tropical coral reef system in the United States at the Flower Garden Banks, an isolated system of predominately encrusting corals atop salt dome formations." The system attracts reef fishes and large open-water species such as hammerhead and whale sharks. The Western Region is also "home to some of the most important nesting sites for the endangered Kemp's ridley sea turtle." The Central Region is home to a resident population of endangered sperm whales, and the Eastern Region includes manatee habitat. And the Louisiana coastline contains a variety of wetlands that make up one of the largest deltas in the world. Moreover the line between the Western and Central Region and	for employees to deal with real and perceived conflicts of interest; and Secretary Salazar and Director Bromwich launched a full review of the use of NEPA, categorical exclusions, during which they are not being used to approve proposed deepwater drilling projects. BOEM places a significant emphasis on public input and scientific analysis, which are critical to safe exploration and development of offshore resources. Public comment is solicited in our environmental review programs for both oil and gas and renewable energy proposals. Plans submitted by industry are subject to rigorous scientific review to ensure that environmental safeguards are the foundation of all offshore energy development. A brief summary of the reforms within BOEM and BSEE since the *Deepwater Horizon* explosion, oil spill, and response can be found on BOEM's website at https://www.boem.gov/Regulatory-Reform/. BOEM and BSEE will remain vigilant in instituting reform efforts and lessons learned since the *Deepwater Horizon* explosion, oil spill, and response. Mitigating measures are an integral part of BOEM's program to ensure that postlease operations are conducted in an environmentally sound manner (with an emphasis on minimizing any adverse impact of routine activities on the environment). BOEM assigns site-specific mitigation by imposing conditions of approval on a plan, permit, or authorization. **Appendix A** discusses BOEM's rigorous postlease process, and **Appendix B** describes over 120 standard mitigations that may be required by BOEM or BSEE as a result of the plan and permit review processes for the Gulf of Mexico

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		the Eastern Region follows the De Soto Canyon off the coast of Alabama and traces the eastern edge of the Loop Current, which effectively divides the Gulf. In other word's the Gulf's size and variation clearly requires greater specificity in the size and location of lease sales. BOEM states in its Draft EIS that the agency is proposing an area-wide approach to provide greater flexibility to industry and balance agency workload. However, BOEM does not have "carte blanche to wholly disregard a statutory requirement out of convenience." Nor can it abdicate its statutory duties under OCSLA or NEPA to appease industry. The designation lacks the precision required by the statute and is therefore unlawful. Moreover, in its Draft EIS, BOEM states that it will no longer conduct a supplemental EIS for each lease sale in the Gulf of Mexico. Instead, BOEM says it will supplemental its Multisale EIS once per calendar year. According to BOEM, this approach is necessary because the short-time frame between lease sales proposed from 2017 to 2022 does not provide sufficient time to prepare an EIS. But this is a product of the agency's own making. There is absolutely no reason BOEM must hold multiple lease sales per year. Indeed, BOEM's new approach appears to violate its duties under OCSLA to comply with NEPA and the Endangered Species Act ("ESA") at every stage of the offshore oil and gas authorization process and its duty to ensure offshore developments is balanced with environmental safeguards and protection of the human, marine, and coastal environments. BOEM's new approach also directly contradicts the Commission's express recommendations that BOEM conduct environmental reviews on a finer geographic scale.	OCS Region.
Center for Biological Diversity, Bold	CBD, BL, GRN, LBB, RAHC-3	BOEM's purpose and need statement fails to comply with NEPA: NEPA's implementing regulations provide that an EIS should "specify the underlying	The text in **Chapter 1.1** has been clarified to state ". . . in accordance with OCSLA, which specifically states 'should be made available for expeditious

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Attorney		purpose and need to which the agency is responding in proposing the alternatives including the proposed action." This purpose and need inquiry is crucial for a sufficient environmental analysis because "[t]he stated goal of a project necessarily dictates the range of 'reasonable' alternatives." Thus, "an agency cannot define its objectives in unreasonably narrow terms" without violating NEPA. BOEM's stated purpose and need for its proposal is "to offer for lease those areas that may contain economically recoverable oil and gas resources" in order to manage the development of oil and gas resources on the OCS. This purpose and need is too narrow and thus inadequate because BOEM necessarily considered an unreasonably narrow range of alternatives. By framing its statement as needing to auction off areas of the OCS that might contain recoverable oil and gas, BOEM necessarily makes auctioning off all of the Gulf of Mexico not under moratorium, i.e., the proposed alternative, the only way to meet such a need. But OCSLA charges the Bureau with ensuring that "environmental safeguards" are in place for offshore oil development and ensuring the "balance [of] orderly energy resource development with protection of the human, marine, and coastal environments" and "national needs." Accordingly, BOEM should have focused its purpose and need inquiry on objectives that comport with these statutory duties. This is particularly true considering that BOEM has already leased more than 22 million acres of the Gulf of Mexico to oil companies, and U.S. commitments to limit greenhouse gas emissions to help prevent the most catastrophic impacts of climate change. Moreover, NEPA evaluation must take place "before decisions are made." Such an approach ensures that agencies will take the requisite "hard look" at	and orderly development, subject to environmental safeguards.'" The alternatives in this Multisale EIS provide a reasonable range of alternatives that provide environmental safeguards, including alternatives and mitigations that can be included at the site-specific decision level. As required by the Five-Year Program, 10 individual phased decisions on whether and/or how to proceed with each proposed lease sale will be made. So while the obligation to fully comply with NEPA does not mature until leases are issued (Center for Biological Diversity v. U.S. Department of the Interior, 2009; Center for Sustainable Economy v. Sally Jewell, 2015), BOEM has chosen to prepare an EIS at this stage to analyze the potential environmental impacts that could result if exploration, development, production, and decommissioning activities eventually occur in order to provide the context and setting of future proposed actions and to better understand the potential impacts associated with these types of activities, as well as the cumulative impacts on GOM resources. This programmatic approach to this Multisale EIS allows more time to include more public involvement, evaluate potential impacts, and provide for a more informed decision, which in turn allows site-specific reviews to tier from this Multisale EIS and be more streamlined. Because of these multiple and tiered programmatic documents, along with future site-specific reviews that tier to these programmatic and discretionary documents, BOEM has taken a hard look at the potential for environmental consequences at each phase of the decisionmaking process that considers a proposed action in the GOM. At each phase, BOEM has identified numerous environmental

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		environmental consequences before approving any major federal action. But BOEM's purpose and need statement indicates that it did just the opposite. In other words, the statement demonstrates that BOEM already made the decision hold offshore oil and gas leases across all of the Gulf of Mexico and that its entire analysis was framed in a way to support that pre-determined outcome. BOEM's backward approach reflects a fundamental misunderstanding of its legal obligations and an apparent desire to appease the oil industry at the expense of our ocean environment and climate.	safeguards to minimize the impacts, i.e., through the consideration of EISs and programmatic mitigation at the Five-Year Program level, consideration of alternatives to limit sensitive topographic features in this Multisale EIS, and commonly applied mitigation measures.
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Attorney	CBD, BL, GRN, LBB, RAHC-14	BOEM Should Not Propose Additional Lease Sales Until it Completes Section 7 Consultation under the ESA: BOEM should complete consultation under the ESA before proposing new lease sales. In enacting the ESA, Congress recognized that certain species "have been so depleted in numbers that they are in danger of or threatened with extinction." Accordingly, a primary purpose of the ESA is "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such . . . species." To reach these goals, Section 9 of the ESA prohibits any person, including any federal agency, from "taking" any endangered species without proper authorization through a valid incidental take permit. The term "take" is statutorily defined broadly as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The definition of "harm" has been defined broadly by regulation as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering." Courts have found federal	BOEM and BSEE have submitted Biological Assessments to NMFS and FWS, and are actively engaged with them in consultation concerning all of our past and reasonably foreseeable future activities. Until the above-mentioned NMFS' formal consultation is complete, BOEM is under an interim consultation agreement with NMFS. . The NMFS and FWS understand the types and levels of activities that BOEM is engaged in and have not raised concerns with our ongoing activities. They are fully informed of the potential impacts identified in this Multisale EIS as well as in the Biological Assessments. The Protected Species Stipulation, if applied, would require already existing terms and conditions and mitigations implemented to protect species at the lease sale stage. As the stipulation notes, BOEM and BSEE can condition approval of any postlease authorization or permit on compliance with the most current mitigations or requirements to protected listed species or habitats at the time. The staged OCSLA decisionmaking and approval process ensures that BOEM and BSEE can require additional protected species protections after leases are issued. Refer to **Chapter 5.8** for more information on the

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		agencies liable for take of listed species where agency-authorized activities resulted in the killing or harming of ESA-listed species. Additionally, Section 7(a)(2) of the ESA requires federal agencies to "insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any [listed] species or result in the destruction or adverse modification of [the critical] habitat of such species." "Action" is broadly defined to include "all activities or programs of any kind authorized, funded, or carried out, in whole or in part" by federal agencies and include granting permits and licenses, as well as actions that may directly or indirectly cause modifications to the land, water, or air. To facilitate compliance with Section 7(a)(2), an "agency shall . . . request" from the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (the Services") information regarding whether any listed species "may be present" in a proposed action area, and if so, the "agency shall conduct a biological assessment" to identify species likely to be affected. The agency must then initiate formal consultation with the Services if a proposed action "may affect" any of those listed species. After formal consultation, the Services issue a biological opinion to determine whether the agency action is likely to jeopardize" any species' existence. If so, the opinion may specify reasonable and prudent alternatives that avoid jeopardy. If the Services conclude that the action or the reasonable and prudent alternatives will not cause jeopardy, the Services will issue an incidental take statement ("ITS") that specifies "the impact, i.e., the amount or extent, of . . . incidental taking" that may occur. When those listed species are marine mammals, the take must first be authorized pursuant to the MMPA, and the ITS must include any additional measures necessary to comply with the MMPA take	ESA consultations.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		authorization. The take of a listed species in compliance with the terms of a valid ITS is not prohibited under Section 9 of the ESA. But an agency's consultation duties do not end with the issuance of a biological opinion. Instead, an agency must reinitiate consultation when: (1) the amount of take specified in the ITS is exceeded; (2) new information reveals that the action may have effects not previously considered; or (3) the action is modified in a way not previously considered. Finally, after consultation is reinitiated, ESA Section 7(d) prohibits the agency from "mak[ing] any irreversible or irretrievable commitment of resources" toward a project that would "foreclos[e] the formulation or implementation of any reasonable and prudent alternative measures." The 7(d) prohibition "is in force during the consultation process and continues until the requirements of section 7(a)(2) are satisfied." As recognized in BOEM's Draft EIS, several federally threatened and endangered species are found in the Gulf of Mexico and may be impacted by its leasing proposal; the proposal also impacts critical habitat for ESA-listed species. Thus, Section 7 of the ESA is clearly triggered. While BOEM engaged in Section 7 consultation on its Five-Year Program for offshore oil and gas leasing in the Gulf of Mexico from 2007-2012, and reinitiated Section 7 consultation following the Deepwater Horizon oil spill, it has not yet completed such consultation. Instead, BOEM is relying on a biological opinion issued by the National Marine Fisheries Service in 2007 that fails to consider the impacts of climate change and does not any impacts of offshore oil and gas activities on several ESA-listed species or their critical habitat in the Gulf of Mexico. Accordingly, BOEM should not propose further lease sales and should suspend approval of leasing and site-specific drilling activities until consultation is complete. Such action is	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		necessary to ensure that its actions do not result in the unauthorized take of listed species, do not jeopardize listed species or their critical habitat, and that such approvals do not "foreclos[e] the formulation or implementation of any reasonable and prudent alternative measures."	
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-14	BOEM says the purpose and need of its analysis is to offer oil and gas lease sales so that oil and gas resources on the OCS can be developed. But the law clearly requires BOEM to analyze the impacts of dirty, dangerous offshore drilling on the Gulf's ecosystem, coastal communities and our climate *before* deciding whether to allow them, not the other way around. BOEM's backward approach reflects a fundamental misunderstanding of its legal obligations and an apparent desire to appease the oil industry at the expense of our ocean environment and climate.	The purpose and need statement in **Chapter 1** has been clarified to state the following: The purpose of the proposed Federal actions in this Multisale EIS is to offer for lease those areas that may contain economically recoverable oil and gas resources in accordance with the OCSLA, which specifically states "should be made available for expeditious and orderly development, subject to environmental safeguards" (OCSLA, 43 U.S.C. §§ 1331 *et seq.*). Please refer to the response to Comment CBD, BL, GRN, LBB, RAHC-3 for more information about BOEM's staged decisionmaking process in **Chapter 1**.
United States Environmental Protection Agency	USEPA-15	Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (65 FR 67249; November 6, 2000), requires regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, and to strengthen the United States government-to-government relationships with Indian tribes. The DEIS states the analyzed environmental justice issues for minority and low income populations is broadly applicable to federally recognized Indian Tribes. Further, it states there is ongoing discussions with designated Tribal representatives. *Recommendation:* EPA recommends the FEIS include updated and completed descriptions of consultation and	BOEM initiated the Section 106 and Tribal consultation processes and a request for comment on the NOI for this Multisale EIS via a formal letter to each of the affected Gulf Coast States on April 3, 2015, and to each of the Gulf Coast State-affiliated federally recognized Indian Tribes, including the Alabama-Coushatta Tribe of Texas, Caddo Nation of Oklahoma, Chitimacha Tribe of Louisiana, Choctaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Jena Band of Choctaw Indians, Miccosukee Tribe of Indians of Florida, Mississippi Band of Choctaw Indians, Poarch Band of Creek Indians, Seminole Tribe of Florida, Seminole Nation of Oklahoma, and Tunica-Biloxi Indian Tribe of Louisiana. The State Historic Preservation Officers for Alabama, Florida, and Louisiana responded via formal letters, all concurring that no historic properties will be affected. The Florida State Historic Preservation Officer further requested to be

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		coordination activities, including correspondence to and from Tribal governments and other consultation-related documents. These documents would demonstrate fulfillment of Tribal consultation duties by the lead agencies and Tribal government engagement.	notified and given the opportunity to comment should any cultural resources be identified off the Florida coast. No additional responses were received. Copies of the received letters can be found in **Appendix K**.
Topic 10 – Other			
Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (CBD, BL, GRN, LBB, RAHC), Kristen Monsell, Staff Attorney	CBD, BL, GRN, LBB, RAHC-1	BOEM's proposal to lease over 70 million acres of the Gulf of Mexico so that oil and gas companies can drill up to 9.5 billion barrels of oil equivalent over the next 70 years will deepen the climate crisis and reverse course on President Obama's commitment to combat climate change. We therefore urge BOEM to halt all new oil and gas lease sales in federal waters and keep these dirty fossil fuels in the ground.	The OCSLA provides the Congressional mandate for BOEM to make "available for expeditious and orderly development, subject to environmental safeguards, in a manner which is consistent with the maintenance of competition and other national needs" the land of the Federal OCS. The proposed Federal action is to offer for lease those areas that may contain economically recoverable oil and gas resources in accordance with the OCSLA (67 Stat. 462), as amended (43 U.S.C §§ 1331 *et seq.*). The decision on whether and how to proceed with each proposed lease sale is under the authority of the Assistant Secretary for Land and Minerals Management and will be disclosed in the Record of Decision following publication of this Final Multisale EIS. According to the President's All-of-the-Above Energy Strategy (The White House, 2014), oil and natural gas supplies are integral to meeting the national energy demand. This plan also aligns with President Trump's America First Energy Plan, which calls for energy policies that stimulate our economy, ensure our security, and protect our health. For more information, please refer to The White House's website (The White House, 2017). Oil from the Gulf of Mexico OCS contributes to
No New Leases Form Letter	NNL-1	I am writing to urge you to halt all new oil and gas lease sales in federal waters and keep these fossil fuels where they belong safely in the ground. The Bureau of Ocean Energy Management's proposal to lease more than 70 million acres in the Gulf of Mexico is absurd. Oil and gas companies would be allowed to drill our ocean for the next 70 years deepening the climate crisis and reversing course on President Obama's commitments to address this global problem.	
Robert	RDS-1	The Bureau of OCEAN ENERGY MANAGEMENT	

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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Desmarais Sullivan		has obligations to the citizens of the United States to find alternative ways of managing energy from the oceans. Fossil fuels have to end, as do any fuels that produce carbon dioxide and methane. That was the agreement in Paris in December of 2015. On Earth Day of 2016, The US signed the agreement. In this another meaningless US treaty like the many signed with Native peoples or will the US respect this one, in view of the fact the ignoring it could actually destroy the US in a fiery climate change. I believe BOEM as a responsible federal agency can play an active role in directing the answers.	meeting domestic demand and enhances national economic security. Although peak OCS production may not occur until some point in the future, oil and gas production is still necessary to bridge to a balanced, or even different, energy future. Over the next 20 years, the U.S. Dept. of Energy's Energy Information Administration expects the U.S. to rely on more oil and natural gas to meet its energy demands, even as alternative sources of energy provide an increasing share of U.S. energy needs. Since the U.S. is expected to continue to rely on oil and natural gas to meet its energy needs, a proposed action would contribute to meeting domestic demand. The OCS is a major long-term supplier of crude oil and natural gas, and the Gulf of Mexico OCS region has the greatest resource potential of the four OCS regions in the United States.
Susan Feathers	SF-3	Finally, I wish there were NO MORE LEASE SALES, and as agency formed to transition to alternative, clean fuel or energy generation, at high speed. With the [CO_2] rising steadily, it seems risky to keep pursuing fossil fuels – sometime, we have to make the commitment to clean energy.	
Lone Star Chapter of the Sierra Club (LSCSC), Cyrus Reed, Conservation Director	LSCSC-1	First of all, we were appreciative of the decision by the Obama Administration to remove future leasing and drilling for the 2017-2022 for the Atlantic Region, and some areas within the Arctic that were originally considered as part of the overall plan for ocean drilling.	Thank you for your comment.
American Petroleum Institute (API), Andy Radford	API-1	Consistent with previous Five-year Program EIS efforts, the GOM Multisale EIS should be designed to serve as a document for future environmental reviews in the Gulf in compliance with the NEPA, its implementing regulations, and BOEM guidance. Future near-term environmental reviews should be able to tier off the analysis conducted in the EIS so the EIS should be designed specifically with the idea of it being used as a reference for future NEPA analysis. This tiering approach will make the best use of BOEM resources.	Thank you for your comment. Please refer to **Chapter 1.3** for more information on the Bureau of Ocean Energy Management's OCS oil and gas program's planning and decision process.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
American Petroleum Institute (API), Andy Radford	API-4	In closing, the American Petroleum Institute is pleased that the BOEM is performing this Multisale EIS so that the NEPA documents can remain current throughout the 2017-2022 Five-year Program. We urge BOEM to continue the process of updating NEPA analyses to ensure the most current science is being used in the decision making process.	Thank you for your comment. BOEM's Gulf of Mexico OCS Region is planning to produce supplemental EISs for each calendar year of the 2017-2022 Five Year Program, and each lease sale decision will have an accompanying NEPA document. Please refer to **Chapter 1.3** for more information on the Bureau of Ocean Energy Management's OCS oil and gas program's planning and decision process.
Consumer Energy Alliance (CEA), Brent Greenfield	CEA-3	On behalf of energy consumers across Texas, the Gulf Coast region, and the entire nation, Consumer Energy Alliance urges the Interior Department to ensure that all Americans are able to affordably heat their homes and feed their children. An "all of the above" approach to energy policy is the only sensible solution, and that must include the Gulf of Mexico.	Thank you for your comment. BOEM is working under President Obama's All-of-the-Above Energy Strategy, which has three main goals: to support economic growth and job creation; to enhance energy security; and to deploy low-carbon energy technologies and lay the foundation for a clean energy future. More information on President Obama's All-of-the-Above Energy Strategy can be found on the White House's website (The White House, 2014). This plan also aligns with President Trump's America First Energy Plan, which calls for energy policies that stimulate our economy, ensure our security, and protect our health. For more information, please refer to The White House's website (The White House, 2017). The decision on whether and how to proceed with each proposed lease sale is under the authority of the Assistant Secretary for Land and Minerals Management and will be disclosed in the Record of Decision following publication of this Final Multisale EIS.
Consumer Energy Alliance (CEA), Brent Greenfield	CEA-4	That is why we urge the Interior Department to include valuable offshore opportunities in the Gulf of Mexico, finalize a Multisale EIS that allows Gulf lease sales to proceed without any further exclusions or restrictions, and reject any demands to take actions that would in any way delay, restrict, or prohibit 2017-2022 lease sales in the Gulf of Mexico.	
The Ehrhardt Group, Caitlin Switzer	EG-1	Lease sales are not about today, but rather, the future. Oil and gas exploration and cultivation are critical to our future. I support the current preferred proposal for lease sales in the Gulf of Mexico. Exploration must continue in the Western and Central blocks of the Gulf of Mexico. We must continue allowing energy companies to further develop their practices, perfecting their operations-getting cleaner, and more efficient than they already are.	
Susan Feathers	SF-1	I am impressed with the process BOEM has established to determine relative risk of oil & gas exploration to marine resources and ecosystems. The fact that B.O.E.M. is its own separate agency is	Thank you for your comment.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

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		a good thing to remove the influences of conflicting interests to protection of waters and wildlife and human communities.	
Hilton Kelley	HK-1	One of the things that we would like to see as a total halt on oil drilling in the Gulf of Mexico due to the fact it's been overburdened already and there are more than 3,400 oil rigs out there already and some of them are abandoned and some of them are leaking.	As of 2013, active platforms were estimated at approximately 2,634 (USDOI, BSEE, 2015; **Chapter 3.3.1.5 and Figure 3-14**). A review of spill data reported to both USCG and BSEE indicates there are no reports of abandoned wells and platforms that are currently leaking. Additional information regarding this issue has been incorporated into this Final Multisale EIS. All of the current terms and conditions of structure and well-removal activities are outlined in NTL 2010-G05, "Decommissioning Guidance for Wells and Platforms," which became effective on October 15, 2010. Any infrastructure that is decommissioned and no longer "economically viable," severely damaged, or idle on active leases is considered "idle iron" according to NTL 2010-G05, "Decommissioning Guidance for Wells and Platforms." The BSEE's idle iron policy keeps inactive facilities and structures from littering the Gulf of Mexico by requiring companies to dismantle and responsibly dispose of infrastructure after they plug nonproducing wells. Operators are required to either (a) remove seafloor obstructions from a lease within 1 year of lease termination or after a structure has been deemed obsolete or unusable or (b) obtain an exemption such as those authorized in Section 388 of the Environmental Protection Act. Section 388 clarifies the Secretary's authority to allow an offshore oil and gas structure, previously permitted under the OCSLA, to remain in place after OCS oil- and gas-related activities have ceased in order to allow the use of the structure for other energy- and marine-

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			related activities.
Hilton Kelley	HK-3	So, we think that the Gulf of Mexico needs an opportunity to heal itself and, also, to sort of replenish some of the wildlife that was there, maybe like 30, 40 years ago, before all the oil spills started happening along the Gulf.	BOEM considered an alternative to delay leasing and determined that it did not warrant full analysis in this Multisale EIS. More information on why this alternative was eliminated from further analysis is provided in **Chapter 2.2.3**. Cancelling all future lease sales and all activities under existing lease sales is not before the agency with this decision and is outside the scope of this Multisale EIS. To the extent that you are requesting cancellation of this proposed lease sale, we acknowledge your preference for Alternative E.
Louisiana Mid-Continent Oil and Gas Association (LAMOGA), Melissa Cloutet	LAMOGA-1	LAMOGA fully supports a continued robust OCS leasing program in the Gulf of Mexico, and we support Alternative A proposed action of the Draft EIS.	Thank you for your comment. The Secretary of the Interior oversees the OCS oil and gas program and is required to balance orderly resource development with protection of the human, marine, and coastal environments while simultaneously ensuring that the public receives an equitable return for these resources and that free-market competition is maintained. The decision on whether and how to proceed with each proposed lease sale is under the authority of the Assistant Secretary for Land and Minerals Management and will be disclosed in the Record of Decision following the publication of this Final Multisale EIS.
Louisiana Mid-Continent Oil and Gas Association (LAMOGA), Melissa Cloutet	LAMOGA-2	For the benefit of the nation, LAMOGA respectfully requests that BOEM continue to provide leasing opportunities in the Gulf of Mexico as well as expand to other OCS areas, including the Eastern Gulf of Mexico.	Thank you for your comment. Currently, much of the EPA is deferred from leasing by the Gulf of Mexico Energy Security Act of 2006 and cannot be offered for lease in this Five-Year Program. Please refer to the *OCS Regulatory Framework* white paper for more information on GOMESA (Cameron and Matthews, 2016).
Renate Heurich	RH-1	And President Obama, in Paris, agreed and signed the Accord where the goal is not just a limit of 2 degrees Celsius, but 1.5 if possible. In order to achieve that, we cannot drill for more oil or gas in the	BOEM recognizes the importance of climate change in its NEPA analyses and considers many facets of the potential effects of climate change in its decisionmaking with respect to oil and gas leasing,

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		Gulf. It's just the opposite of what we should be doing. We should look for renewable sources of energy in the ocean. Other countries are able to do it; we should absolutely be able to do it to the Gulf. There is the possibility to build wind turbines. Those devices get more and more efficient all of the time. They also get cheaper. We already have -- we could put cables through the pipelines that are running already from rigs onshore, so we could try to use the infrastructures already there.	whether in the Five-Year Program or lease sale analyses. In the Five-Year Program EIS, BOEM compares greenhouse gas emissions from direct OCS emissions to those that could occur from energy substitutes that would presumably replace OCS production in the absence of a new OCS Program and comparable demand levels. Downstream greenhouse gases have been quantified. Please refer to the Five-Year Program EIS and to **Chapter 4.1** (Air Quality) of this Final Multisale EIS for additional information about how BOEM evaluates greenhouse gas emissions and climate change. BOEM expects that reducing OCS oil and gas consumption in the U.S. and the associated emissions from limiting OCS leasing would largely be offset by substitutes from other energy sources, either within the United States or elsewhere. BOEM has considered a no action alternative (i.e., cancellation of a proposed lease sale); however, that does not necessarily equate to zero downstream greenhouse gas emissions from oil and gas unless energy demand or supply changes drastically or cost-competitive clean energy sources are substituted. BOEM also has jurisdiction over renewable energy on the OCS, but this is an oil and gas leasing decision required to be considered under the OCSLA and the Five-Year Program. Therefore, renewable energy leasing is outside of the scope of this Multisale EIS. This Multisale EIS tiers from the Five-Year Program EIS and has included a summary of the information in **Chapter 4.0**.
Yolanda Ferguson	YF-2	You know, do you charge every year for a fee for them to be out there for like – for the wells that you have? You -- they've already bid on the wells and	Thank you for your comment. The OCSLA grants the Secretary of the Interior the authority to issue leases on the OCS. Section 18(a)(4) of the OCSLA

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		they won the leases. Do you all charge for the leases every year?	states that "Leasing activities shall be conducted to assure receipt of fair market value for the lands leased and the rights conveyed by the Federal Government." Lessees pay bonuses, rentals, and royalties reflecting the value of the rights to explore and potentially develop and produce OCS oil and gas resources. BOEM sets minimum bid levels, rental rates, and royalty rates by individual lease sale based on its assessment of market and resource conditions as the proposed lease sale approaches. When the lease is acquired, a bonus bid is paid. The bonus bid is the winning highest dollar amount paid at the time of the lease sale. This acquisition cost reflects the opportunity cost of exploring and producing those mineral resources. During the initial term of a lease and before royalty on production is paid, the lessee pays annual rentals in an amount prescribed in the Final Notice of Sale. Rentals reflect the holding cost of the lease during the initial term prior to production in paying quantities. In recent lease sales, BOEM has imposed rentals that escalate over time to encourage faster exploration and development of leases. The Government receives a royalty payment once production starts. The royalty rate is a percentage of production. The royalty rate is used to calculate the royalty payment, i.e., the dollar amount paid based on the value of the amount of production. Under certain conditions, the royalty payment might be temporarily waived. Known as royalty relief, this generally occurs when an economic incentive is needed to spur additional production, such as in a frontier area or deeper water depth. Price thresholds or triggers suspend royalty payments if market prices are low but do not suspend royalty payments if market prices are high.

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
			Price thresholds provide an incentive when production might not otherwise occur. Additionally, they provide protection when market prices are high and the incentive is no longer needed. Revenues from OCS leases consist of bonuses, royalties, and rentals and are collected by ONRR. These revenues are shared with coastal states, as directed by statute, and the remaining funds are deposited in the U.S. Treasury. The OCS revenues provide annual deposits of nearly $900 million to the Land and Water Conservation Fund and $150 million to the Historical Preservation Fund. By statute, coastal states share a portion of the revenues from OCS leasing and production under three programs: (1) the OCSLA's Section 8(g) revenue sharing program that provides states with offshore Federal leases located within the first 3 mi (5 km) of the State's seaward boundary receive 27 percent of the revenue generated from those leases; (2) the Coastal Impact Assistance Program (CIAP) for Alaska, Alabama, California, Louisiana, Mississippi, and Texas; and (3) the Gulf of Mexico Energy Security Act (GOMESA) for Alabama, Louisiana, Mississippi, and Texas. For more information on OCS oil and gas leasing, please refer to BOEM's leasing fact sheet (USDOI, BOEM, 2016c).
John Young	JY-2	Have the Environmental Defense Center and Surfrider Foundation objections to the draft Programmatic Environmental Assessment of these agencies been evaluated and incorporated into the assessment? [See "Flaws in Government's Analysis of Offshore Fracking and Acidizing Exposed by Environmental Groups," Environmental Defense Center, 03·23·2016, Santa Barbara Independent. http:l/www.independent.com/pr/ 2016/mar/23/flaws-	Well stimulation activities and potential impacts differ greatly between the Pacific and Gulf of Mexico OCS due to a variety of factors (e.g., different reservoir properties and different affected environment); therefore, BOEM has analyzed the use and potential impacts from these activities specifically for the Gulf of Mexico OCS in this Multisale EIS. The primary impact-producing factor of concern related to well stimulation activities in the

Table L-1. Public Comments and BOEM's Response Matrix (continued).

Commenter	Comment ID	Comment	Response
		governments-analysis-offshore-fracking-and-a/J If so. let us know. If not, give us an update and a chance to join in on the negotiations.	Gulf of Mexico OCS would be discharges of well treatment, completion, and workover fluids, which are discussed in **Chapters 3.1.5.1, 3.1.3.1, and 4.2**. The potential effects of produced waters (including well treatment, completion, and workover fluids) on other resources, such as deepwater benthic communities (**Chapter 4.4.2**), live bottom habitats (**Chapter 4.6**), and protected species (**Chapter 4.9**) have also been analyzed and are expected to be negligible due to the assumed compliance with all permitting requirements and existing regulations.
John Young	JY-3	Has the Government Accountability Office's been satisfied yet that the Bureau of Safety and Environmental Enforcement's investigative and enforcement policies, procedures, and action are now adequate? [See "GAO: BSEE makes little progress on offshore oil, gas reforms," Nick Snow, 03-21-2016, Oil & Gas Journal, hitp:lwww.ogj.com/articles/print/volume-114/issue-3b/general-interest/gao-bsee- makes-little-progress-on- offshore-oil-gas-reforms.html ! If so. let us know. If not, give us an update and a chance to join in on the negotiations. As of 03-23-2016, the Gulf Restoration Network reported little action on the BSEE rule changes recommendations following the 2010 BP Deepwater Horizon disaster [http:l/healthygulf. org/protect-gulf-oi l-disasters-0/].	Thank you for your comment. The GAO report is outside the scope of this Multisale EIS. However, BOEM acknowledges your concerns, has forwarded your email to BSEE, and recommends that you contact BSEE directly regarding your requests. Please also see the response to Comment CBD, BL, GRN, LBB, RAHC-7.

References Cited

American Bureau of Shipping (ABS) Consulting, Inc. 2016. 2016 Update of occurrence rates for offshore oil spills. Report to the Oil Spill Preparedness Division of the Bureau of Safety and Environmental Enforcement. 95 pp.

Anderson, C., M. Mayes, and R. Labelle. 2012. Update of occurrence rates for offshore oil spills. U.S. Dept. of the Interior, Bureau of Ocean Energy Management and Bureau of Safety and Environmental Enforcement, Herndon, VA. OCS Report BOEM 2012-069 or BSEE 2012-069. 87 pp.

Baker, K., D. Epperson, G. Gitschlag, H. Goldstein, J. Lewandowski, K. Skrupky, B. Smith, and T. Turk. 2013. National standards for a protected species observer and data management program: A model using geological and geophysical surveys. NOAA Technical Memorandum NMFS-OPR-49. 73 pp.

Bargu, S., M.M. Baustian, N.N. Rabalais, R. Del Rio, B. Von Korff, and R.E. Turner. 2016. Influence of the Mississippi River on *Pseudo-nitzschia* spp. abundance and toxicity in Louisiana coastal waters. Estuaries and Coasts 39: 1345-1356.

Baumann, R.H. and R.E. Turner. 1990. Direct impacts of outer continental shelf activities on wetland loss in the central Gulf of Mexico. Environmental Geology and Water Sciences 15(3):189-198.

Boehm, P., D. Turton, A. Raval, D. Caudle, D. French, N. Rabalais, R. Spies, and J. Johnson. 2001. Deepwater program: Literature review, environmental risks of chemical products used in Gulf of Mexico deepwater oil and gas operations. Volume I: Technical report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2001-011. 326 pp.

Broecker, W.S. and T. Takahashi. 1977. Neutralization of fossil fuel CO_2 by marine calcium carbonate. In: Andersen, N.R. and A. Malahoff, eds. The fate of fossil fuel CO2 in the oceans. New York, NY: Plenum Press. Pp. 213-248.

Cameron, B., Jr. and T. Matthews. 2016. OCS regulatory framework for the Gulf of Mexico region. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Report BOEM 2016-014. 24 pp.

Center for Biological Diversity v. U.S. Department of the Interior. 2009. Case Nos. 07-1247 and 07-1344. F.3d 466. Argued October 17, 2008. Decided April 17, 2009.

Center for Sustainable Economy v. Sally Jewell. 2015. Case No. 12-1431. 779 F.3d 588. Argued September 11, 2014. Decided March 6, 2015.

Close F., B. McCavitt, and B. Smith. 2008. Deepwater Gulf of Mexico development challenges overview. SPE North Africa Technical Conference and Exhibition. Marrakech, Morocco. March 12-14, 2008. SPE 113011.

Chatar, C., R. Israel, and A. Cantrell. 2010. Drilling deep in deepwater: What it takes to drill past 30,000 ft. IADC/SPE Drilling Conference and Exhibition, New Orleans, LA, February 2-4, 2010. IADC/SPE 128190.

DeCort, T. 2012. Official communication. Email from Thierry DeCort regarding spill duration and volume of spill. May 11, 2012. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, Resource Evaluation, New Orleans, LA.

Deepwater Horizon Natural Resource Damage Assessment Trustees. 2016. *Deepwater Horizon* oil spill: Final programmatic damage assessment and restoration plan and final programmatic environmental impact statement. 495 pp. Internet website: http://www.gulfspillrestoration.noaa.gov/restoration-planning/gulf-plan/. Accessed June 15, 2016.

Del Rio, R., S. Bargu, D. Baltz, S. Fire, G. Peterson, and Z. Wang. 2010. Gulf menhaden (*Brevoortia patronus*): A potential vector of domoic acid in coastal Louisiana food webs. Harmful Algae 10 (2010): Pp. 19-29.

Dismukes, D. 2011. Official communication. Email regarding scenario projections. Associate Director, Louisiana State University, Center for Energy Studies, Baton Rouge, LA. June 29, 2011.

Doney, S.C., V.J. Fabry, R.A. Feely, and J.A. Kleypas. 2009. Ocean acidification: The other CO_2 problem. Annual Review of Marine Science 1:169-192.

Eckle, P., P. Burgherr, and E. Michaux. 2012. Risk of large oil spills: A statistical analysis in the aftermath of Deepwater Horizon. Environmental Science and Technology 46:13002-13008.

Epperly, S.P., J. Braun-McNeill, and P.M. Richards. 2007. Trends in catch rates of sea turtles in North Carolina, USA. Endangered Species Research 3(3):283-293.

Etkin, D.S. 2009. Analysis of U.S. oil spillage. American Petroleum Institute, Regulatory and Scientific Affairs Department. API Publication 356. 86 pp.

Feely, R.A., S.C. Doney, and S.R. Cooley. 2009. Ocean acidification; present conditions and future changes in a high-CO_2 world. Oceanography 22(4):36-47.

Hart, K.M., D.G. Zawada, I. Fujisaki, and B.H. Lidz. 2013. Habitat use of breeding green sea turtles *Chelonia mydas* tagged in Dry Tortugas National Park: Making use of local and regional MPAs. Biological Conservation 161(2013):142-154.

Ji, Z-G., W.R. Johnson, and G.L. Wikel. 2014. Statistics of extremes in oil spill risk analysis. Environmental Scientific Technology 48(17):10505-10510. doi:10.1021/es501515j.

Jochens, A., D. Biggs, K. Benoit-Bird, D. Engelhaupt, J. Gordon, C. Hu, N. Jaquet, M. Johnson, R. Leben, B. Mate, P. Miller, J. Ortega-Ortiz, A. Thode, P. Tyack, and B. Würsig. 2008. Sperm whale seismic study in the Gulf of Mexico: Synthesis report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2008-006. 341 pp.

Kaiser, M.J. 2015. Offshore service vessel activity forecast and regulatory modeling in the U.S. Gulf of Mexico, 2012-2017. Marine Policy 57:132-146.

Miller, J.E., S.W. Baker, and D.L. Echols. 1995. Marine debris point source investigation 1994-1995, Padre Island National Seashore. U.S. Dept. of the Interior, National Park Service, Corpus Christi, TX. 40 pp.

Mullin, K.D. and G.L. Fulling. 2004. Abundance of cetaceans in the oceanic northern Gulf of Mexico, 1996-2001. Marine Mammal Science 20:787-807.

Mullin, K.D. and W. Hoggard. 2000. Visual surveys of cetaceans and sea turtles from aircraft and ships: Chapter 4. In: Davis, R.W., W.E. Evans, and B. Würsig, eds. Cetaceans, sea turtles and birds in the northern Gulf of Mexico: Distribution, abundance and habitat associations. Volume II: Technical report. U.S. Dept. of the Interior, Geologic Survey, Biological Resources Division, USGS/BRD/CR-1999-005 and U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2000-003. 364 pp.

Mullin, K., W. Hoggard, C. Roden, R. Lohoefener, C. Rogers, and B. Taggart. 1991. Cetaceans on the upper continental slope in the north-central Gulf of Mexico. U.S. Dept. of the Interior, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 91-0027. 108 pp.

Mullin, K.D., W. Hoggard, C.L. Roden, R.R. Lohoefener, C.M. Rogers, and B. Taggart. 1994. Cetaceans on the upper continental slope in the north-central Gulf of Mexico. U.S. Fishery Bulletin 92:773-786.

National Research Council. 2015. Sea Change: 2015-2025 decadal survey of ocean sciences. National Research Council, Committee on Guidance for NSF on National Ocean Science Research Priorities: Decadal Survey of Ocean Sciences; Ocean Studies Board; and Division on Earth and Life Studies. Washington, DC: National Academies Press. 98 pp. Internet website: http://www.nap.edu/catalog/21655/sea-change-2015-2025-decadal-survey-of-oceansciences. Accessed January 19, 2017.

Nguyen, J.H. and D.W. Nelson. 2015. In the United States Court of Appeals for the Ninth Circuit, District Court for the District of Alaska; Summary for the Alaska Wilderness League v. Jewell, this document applies to: No. 13-35866, ID: 9570028, DktEtry: 78-1, In re: Judge Nguyenm Judge Nelson, and Judge Jerome Farris. 41 pp.

Ogren, L.H. 1989. Distribution of juvenile and subadult Kemp's ridley turtles: Preliminary results from the 1984-1987 surveys. In: Proceedings from the 1st Symposium on Kemp's Ridley Sea Turtle Biology, Conservation, and Management. Sea Grant College Program, Galveston, TX. Volume 116.

Reeves, R.R. and H. Whitehead. 1997. Status of the sperm whale, *Physeter macrocephalus*, in Canada. Canadian-Field Naturalist 111(2):293-307.

Roberts, J., B. Best, L. Mannocci, E. Fujioka, P. Halpin, D. Palka, L. Garrison, K. Mullin, T. Cole, C. Khan, W. McLellan, D.A. Pabst, and G. Lockhart. 2016. Habitat-based cetacean density models for the U.S. Atlantic and Gulf of Mexico. Scientific Reports 6:22615. doi:10.1038/srep22615.

Shultz, J. 1999. The risk of accidents and spills at offshore production platforms: A statistical analysis of risk factors and the development of predictive models. Doctoral dissertation, Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburgh, PA.

Thatcher, C.A., S.B. Hartley, and S.A. Wilson. 2011. Bank erosion of navigation canals in the western and central Gulf of Mexico. U.S. Dept. of the Interior, Geological Survey, National Wetlands Resource Center, Open-File Report 2010-1017 and U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement, Gulf of Mexico OCS Region, New Orleans, LA, OCS Study BOEMRE 2010-039. 32 pp. + 2 apps. Internet website: http://pubs.usgs.gov/of/2010/1017/pdf/OF10-1017.pdf.

The White House. 2014. The all-of-the-above energy strategy as a path to sustainable economic growth. Executive Office of the President of the United States, Washington D.C. Updated July 2014. 43 pp. Internet website: https://obamawhitehouse.archives.gov/sites/default/files/docs/aota_energy_strategy_as_a_path_to_sustainable_economic_growth.pdf.

The White House. 2017. An America first energy plan. Internet website: https://www.whitehouse.gov/america-first-energy. Accessed February 1, 2017.

Turner, R.E. and D.R. Cahoon. 1987. Causes of wetland loss in the coastal Central Gulf of Mexico. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 87-0119, 87-0120, and 87-0121. 32, 400, and 122 pp., respectively.

U.S. Dept. of Commerce. National Oceanic and Atmospheric Administration. Office of Response and Restoration. 2016. Oil and chemical spills. Internet website: http://response.restoration.noaa.gov/oil-and-chemical-spills. Accessed November 7, 2016.

U.S. Dept. of Homeland Security. Coast Guard. 2016. National pollution funds center glossary. Internet website: https://www.uscg.mil/npfc/glossary.asp. Accessed November 7, 2016.

U.S. Dept. of the Interior. Bureau of Ocean Energy Management. 2016a. Outer Continental Shelf oil and gas leasing program: 2017-2022—Final environmental impact statement. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Herndon, VA. OCS EIS/EA BOEM 2016-060.

U.S. Dept. of the Interior. Bureau of Ocean Energy Management. 2016b. 2017-2022 Outer Continental Shelf Oil and Gas Leasing Proposed Final Program. November 2016. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Sterling, VA. 269 pp.

U.S. Dept. of the Interior. Bureau of Ocean Energy Management. 2016c. Oil and gas leasing on the outer continental shelf. Internet website: https://www.boem.gov/uploadedFiles/BOEM/Oil_and_Gas_Energy_Program/Leasing/5BOEMRE_Leasing101.pdf. Accessed November 7, 2016.

U.S. Dept. of the Interior. Bureau of Ocean Energy Management. 2017. Catastrophic spill event analysis: High-volume, extended-duration oil spill resulting from loss of well control on the Gulf of Mexico outer continental shelf; 1st revision. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, New Orleans, LA. OCS Report BOEM 2017-007. x + 334 pp.

U.S. Dept. of the Interior. Bureau of Safety and Environmental Enforcement. 2015. Installations and removals – offshore production facilities in federal waters. Internet website: http://www.bsee.gov/uploadedFiles/BSEE/Newsroom/Offshore_Stats_and_Facts/OCSPlatformActivity%20%201942-%202013final.pdf. Accessed November 9, 2015.

U.S. Dept. of the Interior. Bureau of Safety and Environmental Enforcement. 2016. Reforms since the *Deepwater Horizon* tragedy. Fact sheet. Internet website: http://www.bsee.gov/april2016-factsheet1/. Accessed November 9, 2016.

U.S. Dept. of the Interior, Bureau of Safety and Environmental Enforcement and U.S. Dept. of the Interior, Bureau of Ocean Energy Management. 2016. Programmatic environmental assessment of the use of well stimulation treatments on the Pacific outer continental shelf: Final programmatic EA. 302 pp. Internet website: http://pocswellstim.evs.anl.gov/documents/final-pea-complete.pdf.

U.S. Dept. of the Interior. Geological Survey. 2017. Florida aquifer system groundwater availability study. Internet website: https://fl.water.usgs.gov/floridan/. Accessed January 19, 2017.

U.S. Dept. of the Interior. Minerals Management Service. 2007. Gulf of Mexico OCS oil and gas lease sales: 2007-2012; Western Planning Area Sales 204, 207, 210, 215, and 218; Central Planning Area Sales 205, 206, 208, 213, 216, and 222—final environmental impact statement. 2 vols. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS EIS/EA MMS 2007-018.

U.S. Environmental Protection Agency. Office of Solid Waste. 2002. Exemption of oil and gas exploration and production wastes from federal hazardous waste regulations. EPA530-K-01-004. 41 pp. Internet website: https://yosemite.epa.gov/oa/eab_web_docket.nsf/Attachments%20By%20ParentFilingId/945EF425FA4A9B4F85257E2800480C65/$FILE/28%20-%20RCRA%20E%26P%20Exemption.pdf.

Waring, G.T., E. Josephson, K. Maze-Foley, and P.E. Rosel, eds. 2014. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments – 2013. NOAA Technical Memorandum NMFS-NE-228. 464 pp. Internet website: http://www.nefsc.noaa.gov/nefsc/publications/.

Waring, G.T., E. Josephson, K. Maze-Foley, and P.E. Rosel, eds. 2016. U.S. Atlantic and Gulf of Mexico marine mammal stock assessments – 2015. NOAA Technical Memorandum NMFS-NE-238. 512 pp.

Wheeler, N.M., S.B. Reid, K.J. Craig, J.R. Zielonka, D.R. Stauffer, and S.R. Hanna. 2008. Cumulative increment analysis for the Breton National Wilderness Area. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2008-058. 334 pp.

Wilson, D., R. Billings, R. Chang, H. Perez, and J. Sellers. 2014. Year 2011 Gulfwide emissions inventory study. U.S. Dept. of the Interior, Bureau of Ocean Energy Management, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study BOEM 2014-666. 182 pp.

Witherington, B., S. Hirama, and R. Hardy. 2012. Young sea turtles of the pelagic *Sargassum*-dominated drift community: Habitat use, population density, and threats. Marine Ecology Progress Series 463:1-22.

United States Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region 6
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August 16, 2016

Mr. Gary D. Goeke, Chief
Environmental Assessment Section
Office of Environment (GM-623E)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

RE: Detailed Comment Letter for 2017 – 2022 Gulf of Mexico Outer Continental Shelf Oil and Gas Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261 Draft Environmental Impact Statement (DEIS) for Offshore Marine Environment and Coastal Counties and Parishes of Texas, Louisiana, Mississippi, Alabama, and northwestern Florida

Dear Mr. Goeke:

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 (CEQ) regulations for implementing NEPA, the U.S. Environmental Protection Agency (EPA) Region 6 office in Dallas, Texas, has completed its review of the DEIS prepared by the Bureau of Ocean Energy Management (BOEM). The purpose of the proposed project is to explore, develop, and produce oil and natural gas in accordance with the Outer Continental Shelf (OCS) Lands Act of 1953. The DEIS assesses the potential environmental impacts of a range of program alternatives aimed at establishing a schedule that will be used for considering where and when oil and gas leasing may be appropriate over a five year period. Four Action Alternatives and the No Action Alternative are identified. The DEIS analyzes the potential impacts of the proposed actions on air and water quality, coastal habitats, deepwater benthic communities, *Sargassum*, live bottom habitats, fishes and invertebrates, birds, protected species, commercial and recreational fisheries, recreational resources, archaeological resources, human resources, and land use.

Thank you for the extension of time for EPA to comment on the DEIS. We appreciate BOEM's sending EPA the enclosed Memo outlining the type of analysis BOEM intends to conduct to analyze indirect greenhouse gas (GHG) emissions related to refining, distribution, and end-use combustion of oil and gas produced from the OCS. The BOEM memo states that the analysis will address estimated GHG emissions from active leases from previous Program prior to 2012, leasing under the current 2012-2017 Program, and new leasing proposed under the

United States Environmental Protection Agency (continued)

2

2017-2022 Program. We understand that the analysis will be provided in a separate technical report that will be incorporated by reference and summarized in the final EIS.

This type of analysis will provide more complete information on indirect impacts of the leasing program and allow for better informed decision-making. The approach preceded the Council on Environmental Quality's August 1, 2016 Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews which should also be followed. We appreciate BOEM undertaking this analysis, which is called for under NEPA, and is particularly appropriate here because the potential indirect GHG emissions associated with the processing, distribution, and end-use consumption of oil and gas produced on the OCS are likely to be significant. While the general approach outlined in the Memo and the analysis that BOEM expects to complete will result in a much more informed analysis, the DEIS as submitted does not contain sufficient information on indirect GHG emissions for EPA to fully assess the environmental impacts of BOEM's Preferred Alternative (Alternative A), so EPA has rated the DEIS as "EC-2" (Environmental Concerns/Insufficient Information). EPA's Rating System Criteria can be found here: http://www.epa.gov/oecaerth/nepa/comments/ratings.html. Detailed comments are enclosed with this letter for your consideration.

Thank you for the opportunity to comment on the DEIS. EPA will review the forthcoming technical analysis and final EIS related to this project when they are completed. If you have any questions or concerns, please contact Kimeka Price at (214)665-7438 or via email at price.kimeka@epa.gov for assistance.

Sincerely,

Robert Houston for Jerry Saunders

Jerry Saunders
Chief
Water Enforcement Branch

Enclosures

United States Environmental Protection Agency (continued)

DETAILED COMMENTS
ON THE
DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE
BUREAU OF OCEAN ENERGY MANAGEMENT
2017 – 2022 GULF OF MEXICO OCS OIL AND GAS
LEASE SALES 249, 250, 251, 252, 253, 254, 256, 257, 259, AND 261
IN
TEXAS, LOUISIANA, MISSISSIPPI, ALABAMA, AND NORTHWESTERN FLORIDA

EPA offers the following comments for BOEM's consideration in preparation of the Final Environmental Impact Statement (FEIS):

Environmental Justice (EJ) and Surrounding Communities

USEPA-1

In the Executive Summary, the DEIS identifies the affected environment of analysis to encompass 133 counties and parishes in five states with over 22.7 million residents. Also, it states the impacts of the proposed action would be immeasurable for environmental justice since low-income and minority communities are located on-shore, distant from Federal OCS oil and gas-related activities. Further, BOEM has determined that the proposed action would not produce environmental justice impacts, since these vulnerable populations are located within the larger context of on-shore and State-regulated nearshore oil and gas activities that are connected to downstream infrastructure over which BOEM has no regulatory authority. Table 1 identifies environmental justice impacts to be minor.

Recommendation:

EPA recommends utilizing the Promising Practice Report (https://www.epa.gov/sites/production/files/2016-5/documents/iwg_promising_practices_final_5-16-2016.pdf) to supplement the applicable requirements for considering and analyzing environmental justice populations.

We recommend the FEIS accurately discuss impacts to environmental justice and Tribal populations, within, along the boundaries, and near the proposed action's operations and activities.

EPA recommends consolidated discussions of direct, indirect, and cumulative impacts to EJ and Surrounding Communities and proposed mitigation thereby making it readily accessible and in layman's terminology.

We recommend utilizing EJ tools and methods (i.e. EJ Screen, U.S. Census Bureau, and area knowledge) in identifying the low income and minority population within or near the

United States Environmental Protection Agency (continued)

USEPA-1

proposed project boundaries, and avoid the use of averaging in determining environmental justice population or communities.

EPA recommends consideration of public comments in the selection of an alternative that minimize any disproportionately high and adverse human health or environmental impacts on minority and low-income populations or individuals.

National Pollutant Discharge Elimination System (NPDES)

USEPA-2

The DEIS states that the Bureau of Safety and Environmental Environment (BSEE) "performs NPDES inspection on behalf of the USEPA for production platforms and drilling rigs though a 1984 Memorandum of Understanding between the U.S. Department of the Interior, the USEPA, and the U.S. Department of Transportation (USDOI, MMS, 1983) and a 1989 Memorandum of Agreement between MMS (BSEE predecessor) and the USEPA Region 6 (USDOI, MMS, 1989)." *See* p. 3-55. Also, it states that "Produced water may be discharged if the oil and grease concentration does not exceed 42 milligrams per liter (mg/L) daily or 29 mg/L monthly average. The discharge must also be tested for toxicity." *See* p. 3-61.

Recommendation:

EPA recommends the statement referenced on page 3-55 start with "BSEE performs NPDES inspections on behalf of USEPA Region 6 for production facilities……" It is later clarified that BSEE *only* conducts NPDES inspections in Region 6 jurisdictional waters, however to make this more clear, the above text is recommended.

We recommend the above text on page 3-61 include a statement that toxicity is primarily for chronic exposure but can include acute exposure.

Well Stimulation

USEPA-3

The DEIS notes reliance on Boehm et al. (2001) for information relating to well stimulation activities in offshore drilling/production in the Gulf of Mexico (GOM). This study discusses the completion, stimulation, and workover chemicals that are used in the GOM. *See* p. 3-64. The Boehm et al. (2001) study outlines a wide variety of chemicals used during the oil and gas extraction process. EPA notes that BOEM is proposing to update this study and has included a proposal to update the study in the 2015-2017 Study Development Plan.

Recommendation:

EPA recommends the inclusion of trend information pertaining to the volumes of well stimulation fluids used in well development, any available information on the formulation

United States Environmental Protection Agency (continued)

USEPA-3

of these fluids, fate and transport, and other updated outcomes and issues relating to the Boehm study.

Wetlands

USEPA-4

EPA has noted in several past EISs that coastal wetland systems in the Gulf of Mexico are very sensitive systems that are increasingly stressed from all types of activities including but not limited to coastal development, maintenance dredging of channels, and oil and gas development. These systems are also stressed due to natural events such as hurricanes. Stresses on these systems are only predicted to increase with climate change and sea level rise.

A report by Stedman and Dahl (2008) on the status and trends of wetlands in coastal watersheds states that the "Gulf of Mexico coastal watersheds exhibited substantial losses in freshwater wetlands. This rate of loss was 6 times higher than the rate of freshwater vegetated wetlands losses in the Atlantic coastal watersheds. The estimated losses for all wetland types in the Gulf of Mexico were 25 times higher than those estimates for the Atlantic over the course of this study."[1] This report also indicates that coastal areas along the panhandle of Florida, Alabama, Mississippi, Louisiana, and Texas are listed as areas of greatest coastal wetland loss in the Gulf of Mexico and that a " majority of the coastal wetland loss (61,800 acres per year) from 1998 to 2004 occurred in the Gulf of Mexico." EPA notes BOEM's efforts to better quantify historical wetland losses for coastal areas in the Gulf of Mexico, the inclusion of State specific information on the status and trends of coastal wetland systems in Chapter 4 of the EIS, and the evaluation of several recent studies looking at the impacts of the Deepwater Horizon spill on these coastal systems.

In Section 4.3.1 Estuarine Systems (Wetlands and Seagrass/Submerged Vegetation), Table 4-4 identifies routine impacts as negligible for pipeline construction and maintenance, navigation channel maintenance dredging, vessel operation, disposal of OCS oil- and gas-related wastes, and construction and use of coastal support infrastructure under Alternatives A, B, C and D. However, on page 4-56 and 4-57, the DEIS states that one (1) pipeline construction resulting in12 - 20 acres of 'land loss' is expected without modern techniques (e.g., trenchless construction) or mitigation. It is unclear how the impacts are deemed negligible.

Trenchless or modern techniques are only required for 'crossing barrier island and shore faces', and the expected impact is negligible. The DEIS identifies access and staging areas for trenchless construction will entail impacts. The Lease Stipulations in Appendix D and the discussions in Section 2.2.4 (Mitigation Measures) does not discuss the requirement to use modern techniques for new pipeline construction. Additionally, Appendix B mitigation measures for pipelines relates solely to deep water construction and does not indicate any measures

[1] Stedman, S. and T.E. Dahl. 2008. Status and trends of wetlands in the coastal watersheds of the Eastern United States 1998 to 2004. National Oceanic and Atmospheric Administration, National Marine Fisheries Service and U.S. Department of the Interior, Fish and Wildlife Service. (32 pages)

United States Environmental Protection Agency (continued)

USEPA-4

required for pipelines in coastal habitat. Further, it appears the DEIS does not fully evaluate new pipeline construction for more inland coastal habitats and wetlands.

Recommendation:

EPA recommends the FEIS clarify how the pipeline construction and operation mitigation measures required of lease operators will be enforceable.

We recommend the FEIS commit to implementation of mitigation measures for all pipeline construction and operations activities in coastal habitats.

EPA recommends the FEIS clarify the basis of negligible impact for pipeline construction and maintenance.

USEPA-5

On pages 4-81 and 4-82 under the Vessel Traffic and Dredging Section, the DEIS identifies the waves generated by boats, ships, barges, and other vessels erode unprotected shorelines and accelerate erosion in coastal barrier beaches already affected by natural erosion processes. Also, it states that the existing armored navigation channels minimize or eliminate the potential for shoreline erosion from vessel traffic. The DEIS identifies the impact of erosion of coastal barrier beaches and associated dunes from vessel traffic to be negligible, and maintenance dredging to be minor.

Recommendation:

EPA recommends the FEIS provide specifics on existing navigation channels which are armored and not armored in order to fully evaluate impacts from vessel traffic and dredging.

USEPA-6

On page 3-4, the DEIS states pipeline capacities are unknown. On pages 3-38 and 3-42, it identifies a mature pipeline network exists in the GOM to transport oil and gas production from the OCS to shore, and projects that the majority of new pipelines would connect to the existing pipeline infrastructure. Additionally, on page 3-35, the DEIS projects that the number of pipeline removals or relocations would increase region-wide as the existing pipeline infrastructure ages. EPA recommends the EIS incorporate specifics on the age, condition, and likely need to replace or rebuild these existing pipelines due to the increased activity from the proposed action and the assessment of negligible impact.

USEPA-7

On page 4-59 under Onshore Facilities, the DEIS states that all new facilities attributed to the OCS Program are described in Section 3.1.7 Coastal Instructure, which included 0 – 1 gas processing plant. Also, it states any large construction project in the coastal zone is likely to impact some wetland acreage, and any impacts upon wetlands are mitigated in accordance with the Clean Water Act requirements, Corps of Engineers' 404 Permit, and State permitting

USEPA-7

requirements. Further, the DEIS states that since no new facilities are estimated with the proposed action and any possible impacts would be mitigated, the impact would be negligible.

On page 4-66 under Coastal Infrastructure and Pipelines, the DEIS states activities that would further contribute to wetland loss include additional construction of access channels to shoreline staging areas and expansion of onshore and offshore facilities. It further projects 0-1 new gas processing facility and 0–1 new pipeline landfall. The DEIS identifies that if a new facility is constructed and a pipeline makes landfall, any impacts to wetlands would be mitigated.

Thus, it appears BOEM is relying on mitigation under the Clean Water act requirements, Corp. of Engineers' 404 Permit, and State permitting programs for any potential reduction or mitigation of impacts. Also, it is appears the DEIS has conflicting statements on whether new facilities are included with the proposed project. Please clarify in the final EIS.

Marine Coastal

USEPA-8

In Section 4.3.1.2 Disposal of OCS-Related Wastes, Trash, and Debris and Section 4.3.2.2 Environmental Consequences, the DEIS states that "BOEM and BSEE have addressed the marine debris issue by imposing marine debris awareness and prevention measures on the oil and gas industry through NTL 2015-BSEE-GOE, which provides guidance to the industry operators regarding dumping trash and debris into the marine environment and informs operators of regulations set by other regulatory agencies (i.e., the USEPA and USCG). Because of the mitigations and awareness, OCS oil- and gas-related trash and debris from a proposed action would result in negligible impacts to estuarine habitat."

In the absence of data to substantiate the effectiveness of these measures, it is unclear how the basis of negligible impact was determined. The impacts of trash and debris on aquatic ecosystems, particularly with regard to micro-plastics are being studied more intensely, and plastic is now found throughout the world's oceans.

Recommendation:

EPA recommends analyzing trend data on oil and gas-related debris washing up on beaches to support the qualitative evaluation. Amounts of vessel and platform litter released to the ocean were estimated as far back as at least thirty years ago by such organizations as the National Academy of Sciences, the Marine Mammal Commission, NOAA and others. More recent studies and beach debris catalogs are available for comparison and trend analysis.

Air Quality

USEPA-9

In Table 1 Alternative Comparison Matrix, air quality impacts are identified as minor for all four Alternatives. However, in Section 4.1.2 Environmental Consequences relating to Air Quality, the DEIS discussed the incomplete and unavailable information needed to assess the impacts from OCS oil and gas-related activities. It also states that the air modeling study results that are necessary to determine if lease sale emissions adversely impact the State/seaward boundary or the shoreline are unavailable. Further, the DEIS identifies that a contract exists to obtain information and the results should be available in the future EIS documents. Thus, there is inadequate information to assess impacts to air quality.

EPA's previous air quality impact comments on the BOEM lease sale EISs have focused generally on mitigation, greenhouse gas emissions, cumulative impacts, emissions above the significant impact level, and on the air quality offshore modeling analysis performed by BOEM.

EPA notes that BOEM is updating the off-shore air quality inventory and impact modeling to substantiate its NEPA decisions and that modeling results will be available after the release of this DEIS. EPA plans to coordinate with BOEM on review of modeling results between the issuance periods of the DEIS and FEIS and will provide additional comments on air quality during the review of the FEIS.

Climate Change and Greenhouse Gases (GHG)

USEPA-10

In Section 3.1.8.6 Greenhouse Gases, the DEIS dos not quantify GHG emissions and does not include a qualitative discussion of climate change impacts associated with the OCS and non-OCS oil- and gas-related operations and activities. On page 4-12, Table 4-1 identifies GHG impacts as minor for Alternatives A, B, C and D. On page 4-34, EPA notes that BOEM is updating air quality inventory and impact modeling to substantiate its NEPA decisions, and that modeling results will be available after the release of this DEIS. EPA plans to coordinate with BOEM on review of modeling results between the issuance periods of the DEIS and FEIS and will provide additional comments on air quality during the review of the FEIS.

Recommendation:

EPA recommends the FEIS estimate the direct and indirect GHG emissions caused by the proposed project and its alternatives, including a discussion of the incremental impacts of the estimated GHGs and an analysis of reasonable alternatives and/or practicable mitigation measures to reduce project related GHG emissions.

We recommend considering climate adaptation measures based on how future climate scenarios may impact the project in the FEIS. The National Climate Assessment (NCA), released by the U.S. Global Change Resource Program[2], contains scenarios for regions

[2] http://nca2014.globalchange.gov/

United States Environmental Protection Agency (continued)

USEPA-10

and sectors, including energy and transportation. Using NCA or other peer reviewed climate scenarios to inform alternatives analysis and possible changes to the proposal can improve resilience and preparedness for climate change.

Mitigation Measures

USEPA-11

In Sections 2.2.4.2 Pre-lease Mitigating Measures by Alternative and 2.2.4.3 Post-lease Mitigating Measures, the DEIS discusses mitigating measures that could be applied at the pre-lease stage and during site-specific plan and/or permit reviews. Further, Appendix B identifies commonly applied mitigating measures that could apply. Specific measures were not identified.

Recommendation:

EPA recommends the FEIS clarify the specific mitigation measures and incorporate a commitment to implement mitigation measures selected to reduce or avoid any adverse impacts from the proposed project.

Hazardous and Solid Waste

USEPA-12

The DEIS discusses the proposed action's OCS and non-OCS oil- and gas-related construction and operations.

Recommendation:

EPA recommends the FEIS identify projected solid and hazardous waste types and volumes, and expected storage, disposal, and management plans, and appropriate mitigation to minimize the generation of hazardous waste (i.e., hazardous waste minimization).

Biological Habitats

USEPA-13

The DEIS identifies BOEM initiated formal consultation with U.S. Fish and Wildlife Service (USFWS). However, the DEIS does not contain a final determination on the environmental consequences of the alternatives.

Recommendation:

EPA recommends the incorporation of USFWS and other State Agencies concurrence on impacts of the proposed project, and a commitment for mitigation, if applicable.

United States Environmental Protection Agency (continued)

Transportation and Traffic

USEPA-14

In Table 1 Alternative Comparison Matrix, land use and coastal infrastructure impacts are identified as major for all Alternatives. In Section 3.1.7 Coastal Infrastructure, the DEIS describes the potential need for new facility construction and for expansions at existing facilities, and transportation services involving both onshore and offshore activities. On page 4-378 and 4-379, it discusses that railways and major interstates are critical to the success of service bases and port facilities. It is unclear the extent and magnitude of transportation and traffic impacts.

Recommendation:

EPA recommends the FEIS clarify transportation and traffic impacts and identify any committed mitigation.

Consultation and Coordination with Indian Tribes

USEPA-15

Executive Order 13175, Consultation and Coordination with Indian Tribal Governments (65 FR 67249; November 6, 2000), requires regular and meaningful consultation and collaboration with tribal officials in the development of federal policies that have tribal implications, and to strengthen the United States government-to-government relationships with Indian tribes. The DEIS states the analyzed environmental justice issues for minority and low-income populations is broadly applicable to federally recognized Indian Tribes. Further, it states there is ongoing discussions with designated Tribal representatives.

Recommendation:

EPA recommends the FEIS include updated and completed descriptions of consultation and coordination activities, including correspondence to and from Tribal governments and other consultation-related documents. These documents would demonstrate fulfillment of Tribal consultation duties by the lead agencies and Tribal government engagement.

National Historic Preservation Act Section 106 Consultation

USEPA-16

In Table 1 Alternative Comparison Matrix, archaeological resources impacts are identified as negligible under all four Alternatives. However, in Section 4.13, the DEIS identifies various scenarios where the potential impact could range from beneficial to major. Further, it states that it is impossible to evaluate the potential impact to an archaeological site from a project action at the programmatic level, and each permitted action during post-lease activities would be assessed for site-specific impacts during the permit application process.

United States Environmental Protection Agency (continued)

9

USEPA-16

Recommendation:

EPA recommends the FEIS includes, as applicable, State and Tribal Historic Preservation Officers concurrence and incorporate any issues raised by the State and Tribal Historic Preservation Officers, as applicable, in Louisiana, Texas Mississippi, Alabama, and Florida, and how the impacts will be addressed and/or mitigated.

Alabama Department of Environmental Management

LANCE R. LEFLEUR
DIRECTOR

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ROBERT J. BENTLEY
GOVERNOR

May 25, 2016

Mr. Gary D. Goeke, Chief
Regional Assessment Section
Office of Environment MS (5410)
Bureau of Ocean Energy Management (BOEM)
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, LA 70123-2394

RE: Gulf of Mexico OCS Oil & Gas Lease Sales 2017-2022
Draft Environmental Impact Statement
ADEM Tracking Code: 2016-244-UNC-BOEM

Dear Mr. Goeke:

On behalf of the Alabama Coastal Area Management Program (ACAMP), the Alabama Department of Environmental Management (ADEM) reviewed BOEM's draft EIS for the referenced proposed five-year lease sale for activities in the Gulf of Mexico. This five-year plan includes Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261. The ADEM offers the following comments for your consideration.

ADEM-1

The ADEM supports the leasing of any unleased blocks in the Gulf of Mexico with the exception of those blocks which are located within 15 miles of the Baldwin County, Alabama coastline. Alabama's Governors have consistently opposed the sale of those leases. In addition, the ADEM requests BOEM require 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 Allen Phelps anytime with questions. He may be reached by phone (251) 304-1176 or by e-mail at: cap@adem.state.al.us.

Sincerely,

Anthony Scott Hughes, Chief
Field Operations Division

c: Dr. Berry (Nick) H. Tew, Jr., Geological Survey of Alabama
Phillip Hinesley, ADCNR Coastal Section
Linda McCool, ADCNR Coastal Section
Brian Cameron Jr., BOEM

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Mobile-Coastal

Alabama Historical Commission

STATE OF ALABAMA
ALABAMA HISTORICAL COMMISSION
468 SOUTH PERRY STREET
MONTGOMERY, ALABAMA 36130-0900

May 10, 2016

LISA D. JONES
ACTING EXECUTIVE DIRECTOR
STATE HISTORIC PRESERVATION OFFICER

TEL: 334-242-3184
FAX: 334-240-3477

Mr. Gary D. Goeke
Chief, Environmental Assessment Section
Office of Environment (GM 623E)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Re: AHC 2016-0729
Draft 2017-2022 GOM Multisale EIS
Gulf of Mexico

Dear Mr. Goeke:

AHC-1

Upon review of the above referenced document, we request that a professional maritime archaeologist survey the project area(s) to identify any cultural resources that may be present. Please submit the resulting report to our office for review and determination prior to construction activities. Please note that the report should conform to Alabama state guidelines for maritime survey (enclosed).

We appreciate your commitment to helping us preserve Alabama's historic archaeological and architectural resources. Should you have any questions, please contact Amanda McBride at 334.230.2692 or Amanda.McBride@preserveala.org. Have the AHC tracking number referenced above available and include it with any future correspondence.

Sincerely,

Lee Anne Wofford

Lee Anne Wofford
Deputy State Historic Preservation Officer

LAW/AMH/amh

THE STATE HISTORIC PRESERVATION OFFICE
www.preserveala.org

Louisiana Department of Natural Resources

JOHN BEL EDWARDS
GOVERNOR

THOMAS F. HARRIS
SECRETARY

State of Louisiana
DEPARTMENT OF NATURAL RESOURCES
OFFICE OF COASTAL MANAGEMENT

May 25, 2016

Mr. Gary D. Goeke, Chief
Environmental Assessment Section
Office of Environment (GM 623E)
Bureau of Ocean Energy Management (BOEM)
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Via e-mail: multisaleeis2017-2022@boem.gov
Gary.Goeke@boem.gov

RE: **C20160062**
Comments on the Draft 2017 – 2022 Gulf of Mexico Draft Multisale Environmental Impact Statement (DEIS)

Dear Mr. Goeke:

The Louisiana Department of Natural Resources, Office of Coastal Management (OCM), has reviewed the Bureau of Ocean Energy Management's (BOEM) Draft Multisale EIS for the referenced five-year OCS leasing program in the Gulf of Mexico.

LADNR-1

OCM has made it a priority to submit comments on all proposed OCS leasing activities in the Gulf of Mexico, in the expectation that BOEM would use this input to produce credible evaluations of the impacts which OCS leasing has and continues to have on this state's coastal resources. Though there has been some gradual improvement over the years in the attention paid to Louisiana's concerns, this DEIS again falls short in that there is inadequate effort made to confirm that model predictions used in the environmental and socioeconomic analyses, are reliable indicators of actual outcomes.

LADNR-2

Further, the DEIS fails to adequately quantify and assess secondary, indirect, and cumulative impacts of OCS oil and gas activities to Louisiana's coastal resources. This state has and continues to suffer environmental consequences from OCS activities which cannot be attributed to a single action or operator, but are clearly a result of activities associated with the Federal government's offshore leasing program.

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Louisiana Department of Natural Resources (continued)

Page 2

LADNR-2

One example, which OCM has raised numerous times in commenting on earlier BOEM actions, is the effect of OCS supply vessels on channel widening. BOEM does make estimates of these potential land losses in several ways throughout the DEIS, which is a positive step. However, these estimates are done on a regional basis even though most of the impacts will be in Louisiana due to the state's central role in supporting the offshore oil and gas industry. BOEM then reaches the conclusion that the impacts are small enough to be ignored, even though the values of land loss are cumulatively significant:

• In the section on Navigation Channels, land loss under the Preferred Alternative is estimated to be 0.99 to 12.4 acres per year, Gulf-wide, based on OCS-related vessel traffic and average rates of channel widening. Over the 50-year span of development due to these lease sales, this amounts to 49.5 to 620 acres (DEIS Table 3-6, Pg. 3-49).

• Elsewhere, BOEM estimates that indirect impacts from wake erosion and saltwater intrusion will result in the loss of 831 acres per year, Gulf-wide, of which less than 2 percent is due to OCS-related traffic. 1 percent of 831 acres per year is 8.31 acres per year, which over 50 years totals 415.5 acres (DEIS pg. 4-59).

• Yet elsewhere, the Louisiana Comprehensive Master Plan is cited as projecting wetland losses in Louisiana at 1,750 square miles over the next 50 years. BOEM's estimate that OCS oil- and gas-related vessel traffic would contribute approximately one percent to this land loss over the next 70 years works out to 175 square miles, or 112,000 acres (DEIS pg. 4-65).

BOEM concludes that "Because of the small incremental increase in cumulative impacts to coastal wetlands associate with OCS oil- and gas-related vessel traffic … impacts are expected to be **minor."** (DEIS pg. 4-66), and " …only **negligible** impacts related to vessel traffic would result from the proposed action" (DEIS pg. 4-58) (emphasis in the original).

However these estimates are calculated, these are NOT minor or negligible losses of wetlands. OCM, through its Coastal Use Permitting Program requires all Coastal Use Permit applicants to mitigate for wetland losses, even those losses that are less than 0.1 acre. The requirement to offset unavoidable cumulative losses is not dependent on the scale of the proposed activity; lost habitat value is lost habitat value. BOEM's characterization of these losses as minor or negligible is a continued abrogation of its responsibilities under the National Environmental Policy Act, Outer Continental Shelf Lands Act, Coastal Zone Management Act, Executive Orders, and the Department of the Interior's policies, all of which make clear that the Federal agency responsible for an activity is also responsible for mitigating for the direct, indirect, secondary and cumulative impacts.

Further, these estimates are merely for the five-year program under consideration, and do not address the impacts to Louisiana of OCS lease sale activities dating back to 1954.

LADNR-3

In a broader sense, it is of concern to OCM that the responsibility within BOEM for compensatory mitigation appears to be unclear. The DEIS states that this responsibility lies with unspecified "program offices" at Headquarters level:

Louisiana Department of Natural Resources (continued)

Page 3

> Program and Policy Issues
>
> Comments and concerns that relate to program and policy are issues under the direction of the U.S. Department of the Interior and/or BOEM's guiding regulations, statutes and laws. The [scoping] comments and concerns related to program and policy issues are not considered to be specifically related to the proposed actions. For example, the Louisiana Department of Natural Resources, Office of Coastal Management requested in their scoping comments that this Multisale EIS make provisions for compensatory mitigation for all lease sale impacts. Such comments are forwarded to the appropriate program offices for their consideration. Programmatic issues …have been considered in the preparation of the Draft Five-Year Program EIS. (DEIS page 2-32).

LADNR-3

However, the *Outer Continental Shelf Oil and Gas Leasing Program: 2017-2022 Draft Programmatic Environmental Impact Statement*, prepared by BOEM's Headquarters office, places the responsibility for compensatory mitigation at the Gulf of Mexico Region level: "Appropriately scaled analyses at these later decisions for leasing, exploration, development, and production can best identify specific mitigation measures, including required compensatory mitigation measures" (pg. 1-8).

Once again, OCM strongly urges BOEM to accept the responsibility to identify and quantify the accumulating coastal impacts of OCS lease sales to Louisiana, and provide appropriate compensatory habitat mitigation.

OCM recognizes the complexity of these issues, and the difficulty in obtaining and analyzing the necessary information. Nevertheless, the efforts made by BOEM to date, in this and prior leasing plans, do not meet the standards set in law.

OCM appreciates the opportunity to offer these remarks. If you have any questions concerning this matter, please contact Jeff Harris of the Interagency Affairs & Field Services Division at (225) 342-7949.

Sincerely yours,

/S/ Don Haydel
Acting Administrator
Interagency Affairs/Field Services Division

DH/SK/jdh

cc: Tershara Matthews, BOEM MS 5412
Brian Cameron, BOEM MS 5412
Project folder C20160062

Leon Soil and Water Conservation District Supervisory Board

Testimony removed here to focus on the comments below. Please refer to the comment from Katrina Dubytz to see the removed testimony.

BRIAN LEE: My name is Brian Lee. I am elected to the Leon Soil and Water Conservation District Supervisory Board in Leon County, Florida, and represent the citizens of Leon County in matters of soil and water conservation.

LSWCDSB-1

And as such, my issues with the BOEM's EIS have to do largely with concepts that are going to potentially affect the ground water in Leon County, because continuing to develop and use fossil fuels is going to contribute to ocean

Leon Soil and Water Conservation District Supervisory Board (continued)

LSWCDSB-1

acidification. When ocean acidification occurs, then salt water intrusion occurs through Florida's karst geology, which can then contaminate our actual drinking water supply in Florida.

So as global warming or climate change is exacerbated by the development and burning of fossil fuels, the shorter we're all going to get on potable water in the state of Florida.

LSWCDSB-2

And the other issue very strongly related to that is the severity of more spills and accidents occurring in the Gulf, happening as climate change becomes exacerbated. So as the climate gets worse, there are going to be more storms, and as there are more storms, the equipment used for drilling and developing fossil fuels in the Gulf is more at risk to damage and causing even more spills.

And thus endeth my testimony.

Alabama Chapter of the Sierra Club

Comment by Carol Adams-Davis

CAROL ADAMS-DAVIS:

I'm Carol Adams-Davis representing Alabama Chapter Sierra Club.

We want to thank the current administration for climate leadership in committing the United States to strong carbon emissions reduction goals in Paris -- in the Paris agreement and for pledging to accelerate the transition away from dirty fossil fuels during the recent State of the Union Address.

ACSC-1

I would like to request a motorium on new federal oil leases until the climate impacts of the federal oil leasing program are taken into account.

ACSC-2

Please take action to cancel lease sales for the Central Planning Area of the Gulf of Mexico. These sales continue the dangerous disconnect between the administration's climate goals and the continued leasing of federal lands and waters for fossil fuel extraction.

Federal leasing of fossil fuels ensures significant carbon pollution, threatening the very well-being of the communities and wildlife we call the Alabama Gulf Coast home.

Alabama Chapter of the Sierra Club (continued)

Offshore production in the Gulf accounts for 17 percent of total federal oil production and 5 percent of gas production. Half of our country's petroleum and natural gas refining capacity also resides along the Gulf Coast. Industry of this scale comes with great costs. Over 10,000 spills have been recorded in the Gulf this decade, and its waters are blighted by some 27,000 abandoned, leaky wells. Coastal wetlands are shrinking about one football field every hour due to natural subsidence, sea level rise, and thousands of miles of canals carved out by oil and gas companies, forcing many residents to permanently relocate.

Six years since the Deepwater Horizon disaster, the Gulf is far from recovered. Fish catches are still down by a third. Oil and dispersant chemicals continue to kill wildlife and impact their reproduction and development. The bottom line is that offshore oil and gas development comes with significant inherent risks that are nearly impossible to avoid or mitigate. While the fossil fuel industry seeks to continue its unchecked

Alabama Chapter of the Sierra Club (continued)

expansion, the people of the Gulf and allies across the country would like the Federal Bureau of Ocean Energy Management to know the Gulf is not an energy sacrifice zone and deserves protection for present and future generations of life.

An end to new leasing would keep up to 450 billion tons of carbon pollution in the ground and further cement your administration's -- or the administration's commitment to a better future.

We denounce the administration's decision to keep Arctic and Gulf of Mexico drilling on the table. Any new offshore drilling will be a stain on President Obama's climate legacy.

If the President is going to meet the targets he agreed to at the climate talks in Paris, he needs to keep fossil fuels in the ground, or in this case, under the Gulf. We can't afford any more oil spilling in our Gulf -- or into our Gulf.

President Obama has spared the people of the Atlantic Coast from another oil catastrophe, but in allowing new drilling in

Alabama Chapter of the Sierra Club (continued)

BOEM PUBLIC MEETING - MOBILE - MAY 18, 2016

the Gulf, he's keeping all of us on course for climate catastrophe. Any new offshore drilling is incompatible with a stable future and it is incompatible with the commitment that President Obama has made. Don't let us-- don't place politics ahead of sound science and a wise energy policy.

I've got more, but I think that's probably all I'll do now. Then I'll send something in written to you, okay?

\- - -

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Apalachicola Riverkeeper

APALACHICOLA RIVERKEEPER

SAVING AN AMERICAN TREASURE

June 15, 2016

Mr. Gary D. Goeke, Chief
Environmental Assessment Section
Office of Environment (GM 623E)
1201 Elwood Park Blvd.
New Orleans, LA 70123-2394

RE: Gulf of Mexico Oil and Gas Lease Sales: 2017-2022 Draft Environmental Impact Statement (EIS)

Dear Mr. Goeke:

Apalachicola Riverkeeper reviewed the referenced document and participated in the public hearing in Panama City, Florida on May 17, 2016. On behalf of our Board of Directors and over 1500 members we provide the following comments. We are grateful to the BOEM staff at the hearing in Panama City. They were extremely helpful in providing information on the organization of the document and some guidance in terms of how the information was developed and presented. Explanation of the BOEM and BSEE structure and relationship were also explained and helpful.

In order that you understand the degree of experience and perspective from which these comments are based, BOEM should understand that Apalachicola Riverkeeper and other plaintiffs filed a Clean Water Act (CWA) and RCRA lawsuits against Taylor Energy Company for its long term (+10 Years) spill, still ongoing, in MC20 Canyon 11 miles off the mouth of the Mississippi River. We spent the better part of three years studying the spill and reporting that was associated with that incident. The lack of transparency, underestimation of risk, spill volume and degree of impacts reported, and lack of ability and capacity to respond to and contain the spill were truly eye opening. It is our assumption from this investigation that poor performance of operations, reporting, regulation, response, and responsibility is more the norm than the exception used and accepted by the oil and gas industry.

AR-1

The method and data BOEM used in developing the document includes flawed assumptions about: 1) the degree of impacts, 2) the accuracy in reporting of volume and range of impacts, and 3) the life or duration of the impacts that result from spills. These assumptions provide an over estimation of the benefits without assessing the real costs of the impacts.

We know that the estimates of past OCS Spills is built on inaccurate and often unreported incidents and spills which grossly underestimates the volume of contaminants leaked and the probable impacts that result from them. BOEM also assumes that certain incidents have a low potential of recurring, when in fact the potential is unknown or much higher. For example the Deep Water Horizon spill is viewed as unlikely to reoccur when in all probability as exploration into deeper water and wells occur, the risk increase with a greater probability of occurring. Realistic evaluations and a new analysis should be undertaken.

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Apalachicola Riverkeeper (continued)

AR-2

In section 3.2, BOEM states that 47% of spills and accidents are due to hurricanes. Hurricanes are a prevalent and known reoccurring event in nature and as such should be planned for in a risk analysis. The statistic demonstrates that these incidents are not able to be planned for or that when the total cost of safe operations are considered, the analysis may not justify operations to recover the oil. At a minimum, hurricanes should be well planned for and those cost of planning and implementing prevention of such losses must be incorporated into costs for justifying and maintaining production. Design and construction of oil and gas facilities that provide a high level of certainty that failures due to hurricanes, such as the Taylor Energy leak, do not occur should be mandatory. Costs associated with a high level of certainty must be understood and planned for as part of implementation by the industry before permits and leases are considered.

AR-3

The discussion in Section 4.16 regarding Irreversible and Irretrievable Commitment of Resources and 4.17 regarding Relationship Between the Short-term Use of Man's Environment and the Maintenance and Enhancement of Long-term Productivity provides insight to the industry's acceptance of permanent losses of a variety of public resources. Taking such losses for granted falls short of recognizing that many of the impacts and losses considered short-term are actually long-term - and are for all practical purposes, irreversible. Section 4.17 suggests that short term use of Man's environment justifies some loss of the long term productivity of the Gulf of Mexico. It also assumes that that loss of productivity will eventually come back. Experience has shown that the duration and degree of the impacts has been underestimated and therefore undervalued, again with the effect of minimizing the costs of the impacts and overestimating the benefits.

AR-4

BOEM considers the Gulf of Mexico as a Class II, moderately productive ecosystem, but then states that the long term productivity is stressed. The assumptions do not provide a scenario that will improve the short or long term productivity back to or closer to its natural level of productivity. The Gulf of Mexico Restoration Council has established programs and projects to improve the Gulf of Mexico back toward its more natural productivity. It is not logical to consider vast numbers of additional acres for oil and gas leases knowing the risk of impacts are high; both short- and long-term when this action is in conflict with the Council's objective. A consistent assessment of goals should be undertaken.

AR-5

In addition to avoiding impacts by making the development of oil resources more safe and sustainable by designing for all classes of hurricanes, mudslides, and other natural events known to be likely to occur, BOEM could improve spill response and clean up requirements. Experience has shown that clean up and spill response is ineffective and often unsuccessful for small spills, such as the Taylor Oil spill going on 10 years leaking with no end in sight, much less catastrophic spills such as Deep Water Horizon. Vastly improved response and clean up seem reasonable and logical if our goal is to recover the health and productivity of the Gulf of Mexico and must be developed and implemented before additional leases are considered.

AR-6

To this end, the "No Action Alternative" should be the preferred alternative until the recommended precautions are available, improved clean up and response are possible, and impacts are better understood and/or known. To expand an industry that is causing significant impacts in the face of a reality where the need for oil and gas is declining and being replaced by energy production that does not result in such short and long term impacts to the health and productivity of the Gulf of Mexico is inconsistent with protection of the public interest. We strongly support the NO Action Alternative.

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Apalachicola Riverkeeper (continued)

Thank you for this opportunity to comment on the proposed oil and gas leasing plans in the Gulf of Mexico. We look forward to working with BOEM to improve the analysis and assumptions the agency and industry use to assess its impacts and operations to provide for a healthy and sustainable Gulf of Mexico.

Best regards,

Dan Tonsmeire
Riverkeeper

Surface Water Protection/Water Quality/Oil Spill/SOG/Strategic Planning/Comments on Gulf of Mexico Oil and Gas Lease - Final

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American Petroleum Institute

May 29, 2015

Mr. Gary Goeke
Chief, Environmental Assessment Section, Office of Environment (GM 623E)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Submitted via email to: multisaleeis2017-2022@boem.gov

Subject: Comments on the 2017–2022 GOM Multisale EIS

The American Petroleum Institute (API) offers the following comments on the scoping notice for the Environmental Impact Statement (2017–2022 Gulf of Mexico Multisale EIS) on the Gulf of Mexico (GOM) oil and gas lease sales tentatively proposed in the 2017–2022 Outer Continental Shelf (OCS) Oil and Gas Leasing Draft Proposed Program (2017–2022 Draft Proposed Program) that the Bureau of Ocean Energy Management (BOEM) published in the Federal Register on April 29, 2015. The API is a national trade association that represents over 625 members involved in all aspects of the oil and natural gas industry. Our members are involved in exploring for and developing oil and natural gas resources in the GOM and given the ongoing research and analyses being conducted in the Gulf of Mexico, it is prudent to update the baseline conditions and potential environmental effects of oil and natural gas leasing.

API and its members are longstanding supporters of the National Environmental Policy Act (NEPA) process as an effective means of identifying and analyzing the potential environmental impacts of proposed federal actions and mitigation measures. We appreciate consideration of the comments set forth below on the Bureau's request for scoping comments and to study additional areas that may become available for lease in the future. We believe that this EIS pursuant to NEPA will also assist BOEM in carrying out statutory responsibilities related to the agencies' role(s) and responsibilities under other Federal statutes (i.e., assessing and minimizing environmental impacts on marine mammals under the MMPA and ESA).

API-1

Consistent with previous Five-year Program EIS efforts, the GOM Multisale EIS should be designed to serve as a document for future environmental reviews in the Gulf in compliance with the NEPA, its implementing regulations, and BOEM guidance. Future near-term environmental reviews should be able to tier off the analysis conducted in the EIS so the EIS should be designed specifically with the idea of it being used as a reference for future NEPA analysis. This tiering approach will make the best use of BOEM resources.

American Petroleum Institute (continued)

API-2

To the extent that BOEM plans to use the new geospatial platform (*GeoPortal*) as part of this EIS scoping process, API understands the quest to make the process more efficient by allowing information submitted to be depicted in a mapping format, but we are concerned about the quality and consistency of data being submitted as comments through this system. We recognize that any form of public comment may include anecdotal data that may be outdated and may or may not be standardized, peer reviewed, or subjected to quality assurance procedures. We request that BOEM consider instituting a quality assurance, quality control system whereby data received through the new *GeoPortal* are reviewed for validity and scientific integrity prior to consideration during the PEIS process. BOEM should take any other necessary steps to make sure data are not biased or improperly interpreted. The EIS must use data from the best available peer-reviewed scientific literature, and not speculation, when assessing potential impacts of oil and natural gas activities on the environment.

API-3

As part of the EIS analysis, BOEM must also consider the extensive safety improvements implemented by the industry and the new requirements imposed on offshore operations since the Deepwater Horizon incident. Throughout the scoping and development of the EIS, BOEM must remember that history indicates the possibility of a catastrophic oil spill remains a very low probability. With the implementation of the new drilling and environmental safeguards adopted by industry, the probability of a catastrophic spill will be reduced even further. In addition, the formation of well containment companies and their ability to assist in the response to any future incidents must be considered.

API-4

In closing, the American Petroleum Institute is pleased that the BOEM is performing this Multisale EIS so that the NEPA documents can remain current throughout the 2017-2022 Five-year Program.. We urge BOEM to continue the process of updating NEPA analyses to ensure the most current science is being used in the decision making process. Should you have any questions on these comments please contact me at (202) 682-8584 or by email at radforda@api.org.

Sincerely,

Andy Radford

American Petroleum Institute (continued)

June 6, 2016

Mr. Gary D. Goeke
Chief, Environmental Assessment Section
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Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Submitted via E-mail to multisaleeis2017-2022@boem.gov

Re: Comments for the 2017-2022 Gulf of Mexico Draft EIS

Dear Mr. Goeke:

The American Petroleum Institute (API) offers the following comments on the U.S. Department of Interior Bureau of Ocean Energy Management's (BOEM's) Draft Environmental Impact Statement (DEIS) for the Gulf of Mexico (GOM) lease sales tentatively scheduled for 2017-2022 (Multisale DEIS). The API is a national trade association that represents over 640 members involved in all aspects of the oil and natural gas industry, including exploring for and developing oil and natural gas resources in the GOM – a vital part of our nation's economy. The industry supports millions of American jobs and delivers billions of dollars in annual revenue to our government.

BOEM's Multisale DEIS addresses 10 potential region-wide GOM Outer Continental Shelf (OCS) oil and natural gas lease sales that may contain substantial reserves of economically recoverable oil and gas resources. The Gulf of Mexico constitutes one of the world's major oil and gas producing areas, and has proved a steady and reliable source of U.S. crude oil and natural gas for more than 50 years.

The GOM is a critically important hydrocarbon energy producing area where existing infrastructure and expertise can be used to increase our nation's oil and natural gas resources. Predictable lease sales in this Planning Area are needed to help ensure continued offshore exploration and production in the future since leases sold today will take many years to fully develop. Predictability and certainty in the leasing program helps companies make the long-term decisions required for offshore development and avoids the potential of having years wasted in bringing vital oil and natural gas production to the market.

Alternatives Considered in the DEIS

API-5

The Multisale DEIS considers five alternatives for the proposed lease sales. API strongly supports Alternative A (the Preferred Alternative) for the 10 GOM lease sales proposed to be held from 2017 through 2022 as described below:

American Petroleum Institute (continued)

API-5

Alternative A (Preferred) would offer for lease all unleased blocks within the proposed WPA, CPA, and EPA portions of the proposed lease sale area for oil and gas operations, with the following exceptions:

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

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

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

API is strongly opposed to *Alternatives B, C, D, and E* for the GOM lease sales. The analysis in the DEIS does not support the adoption of such restrictive alternatives. Adoption of *Alternative A* is fully consistent with the agency's analysis.

BOEM's NEPA Analysis

API-6

API believes that the detailed analysis provided in the DEIS, along with the other supporting environmental documents and additional assessments being conducted by BOEM provide a thorough analysis upon which to make decisions related to the first proposed lease sale (Regionwide Lease Sale 249), new or revised exploration and development plans in the CPA, and future permit applications, without delay.

API supports the analysis made by BOEM in the Multisale DEIS, but there are issues that BOEM needs to address before finalizing the DEIS. API notes that the DEIS contains (by reference) updated information and analyses regarding the 2010 Macondo oil spill. This new information supports the NEPA process by describing the current environmental baseline conditions in the GOM including the results of new scientific studies regarding the spill. We encourage BOEM to continue reviewing and evaluating the good, peer-reviewed science in this and other areas and to avoid the use of unsubstantiated or anecdotal information.

API supports BOEM's effort to develop technical reports supporting technical information in previous NEPA reviews and reduce the overall page length and encyclopedic nature of NEPA reviews. Due to the report lengths, publication dates of the reports (2016), and time allotted to the review the DEIS, we recommend that BOEM provide an opportunity to review and comment on technical reports to support an adaptive approach "conducive to reducing the size of this Multisale EIS and future NEPA documents". While BOEM believes there have been minimal updates to information in the technical reports, that should not be the reason for not providing an opportunity for stakeholder input, especially with reports that could be influenced by the substantial data and information being provided post-Macondo by stakeholders, including the oil and gas industry. API hopes that future NEPA documents represent a truly streamlined analysis of only new information, but only supports if such information is added through appropriate consultation from all appropriate stakeholders, including the oil and gas industry, in the Gulf of Mexico region.

BOEM need not assert that OCS lease sales require the preparation of an EIS.

API-7

On p. v of the DEIS, BOEM should replace the phrase "requiring an EIS" with "requiring environmental review under the National Environmental Policy Act ("NEPA")." Leasing, developing, and producing oil and gas resources on the (OCS) under the OCS Lands Act ("OCSLA") is a staged decision-making process. *See e.g., Native Village of Point Hope v. Jewell*, 740 F.3d 489, 493 (9th Cir. 2014). Because issuing OCS leases does not involve an irretrievable commitment of resources to any action with significant environmental consequences, NEPA does not compel the preparation of an EIS. *Cf. Sec'y of the Interior v. California*, 464 U.S. 312 (1984); *Native Village of Point Hope*, 740 F.3d at 493; *Connor v. Burford*, 863 F.2d 1521 (9th Cir. 1988). Though BOEM traditionally has prepared an EIS for OCS lease sales, BOEM need not make unnecessarily broad statements.

American Petroleum Institute (continued)

BOEM should clarify that the DEIS considers the cumulative environmental impact of all of the proposed lease sales.

API-8

BOEM indicates the DEIS will be used to decide whether, and under what circumstances, lease sale 249 will be held in 2017. DEIS at p. iii. However, the DEIS is also intended to consider the environmental impacts associated with nine additional lease sales from 2018-2022. Though additional NEPA review will occur for later decisions to hold any of those individual lease sales, that analysis likely will tier heavily from the current DEIS (*see* p. 2-4). Although it is clear in the introductory material and the discussion of the alternatives in Chapter 2 that the DEIS is intended to cover up to 10 lease sales, it becomes less clear as BOEM moves on to discuss the direct, indirect, and cumulative impacts of "a proposed action." BOEM should first clarify that "a proposed action" means "any of the 10 lease sales proposed for the GOM in 2017 to 2022." More importantly, BOEM should ensure that its impact analysis considers not only the environmental impacts of each lease sale, but also the cumulative impacts of *all* contemplated lease sales. Doing so is not only an important aspect of the cumulative impact analysis for Lease Sale 249, but also will likely reduce the NEPA burden for each of the nine subsequent lease sales.

BOEM should clarify certain aspects of its cumulative impacts analysis, focus on the effects specifically from the proposed action and alternatives, and amend its "impact-producing factors" tables for consistency with the narrative analysis.

API-9

As BOEM recognizes, a good NEPA analysis considers the cumulative impacts of the proposed action and alternatives. "Cumulative impact" is "the impact on the environment which results from the *incremental impact of the action* when added to other past, present, and reasonably foreseeable future actions regardless of what agency... or person undertakes such actions...." 40 C.F.R. § 1508.7 (emphasis added). Although the DEIS accounts for impacts associated with many other past, present, and future actions affecting the same resources as the lease sales, it presents the information in tables that can appear somewhat misleading and overstate the impacts of the leasing actions under consideration. This may be because the agency conflates the impacts of these other factors with the cumulative, incremental impacts of the proposed lease sales.

For example, the "impact-producing factors" (Table 4-4 on p. 4-51) indicates that the cumulative impact of "OCS Oil and Gas" on estuarine systems will be "moderate," while the cumulative impact of non-OCS oil and gas on estuarine systems will be "major." From the discussion in the impact analysis, it appears that BOEM is saying that the *incremental impact* of OCS oil and gas activities on those systems is "minor" when added to the past, present, and reasonably foreseeable future impacts of non-OCS oil and gas activities. However, the table could easily be misinterpreted to mean that the otherwise "minor" impacts of OCS oil and gas activities will become incrementally "major" when added to other past, present, and reasonably foreseeable future non-OCS oil and gas activities. This interpretive issue is present in many of

American Petroleum Institute (continued)

API-9

the "impact-producing factors" tables contained in Chapter 4 of the DEIS. *See, e.g.,* Table 4-5 at p. 4-75. At a minimum, BOEM should revise these tables to ensure that the cumulative, incremental impact *of the proposed action(s)* (i.e., lease sales) is made clear and distinct from the impacts of other actions that BOEM is not proposing to undertake.

This problem is particularly pronounced in the analysis of impacts to land use and coastal infrastructure, which appears to contain a number of additional internal inconsistencies. For example, on p. xxvii of the DEIS, BOEM explains that "[b]ecause OCS oil- and gas-related activities are supported by [a] long-lived, expansive onshore network, the potential impacts of a proposed lease sale are not expected to produce any major impacts to land use and coastal infrastructure." Yet the impact levels for land use and coastal infrastructure indicated in the "Alternative Comparison Matrix" Table 1 on p. xvii of the DEIS are the *only* impacts associated with OCS oil and gas leasing characterized as potentially "major." DEIS at pp. xvi-xvii.

Moreover, examination of the impact analysis for land use and coastal infrastructure in Chapter 4 of the DEIS indicates nominally "negligible" to "moderate" impacts on land use and coastal infrastructure. Yet the cumulative impacts portion of the "impact-producing factors" table on p. 4-373 indicates a potentially "major" cumulative impact. In contrast, the substantive cumulative impact analysis on p. 4-384 of the DEIS indicates a "minor" incremental impact. All this apparently conflicting information makes it difficult to determine the degree of impact, cumulative or otherwise, that the proposed lease sales are expected to have on land use and coastal infrastructure, and needs to be harmonized or explained. At a minimum, BOEM should revisit the impact assessment for land use and coastal infrastructure to ensure its accuracy and consistency. API suggests BOEM incorporate the changes below in regards to clarifying analyses (see below) and by incorporating more clear description of the methodology used to determine cumulative impacts, including clear documentation of the evidence used to determine impact levels that inform the cumulative analysis.

Although the source of these apparent inconsistencies is unclear, it may be associated with BOEM confusing the relatively minor incremental cumulative impact of the proposed lease sales with the impact of other (i.e., non-OCS oil and gas related) activities. At a minimum, BOEM should revisit the impact assessment to ensure accuracy and consistency through this DEIS as additional NEPA review for later decisions to hold any of the individual lease sales will tier heavily from this current DEIS.

<u>The apparent discrepancy between the impact assessments in Chapter 4 and the "Alternative Comparison Matrix" (Table 1) may create the mistaken impression that BOEM is underestimating the impacts of the lease sale(s).</u>

API-10

Table 1 on pp. xvi-xvii of the DEIS contains an "Alternative Comparison Matrix" comparing the impacts of each alternative on all of the major environmental receptors analyzed in the DEIS. According to the table, for most environmental receptors (including live bottoms, fishes and invertebrates, air and water quality, protected species, and recreational activities), the impacts of the proposed lease sales are anticipated to be "beneficial" to "moderate."[1] However, the conclusions about the degree of impact in the matrix appear to be at odds with the conclusions in the environmental impact analyses in Chapter 4, many of which contemplate impacts greater than those identified in the matrix. While it is possible that this can be explained

[1] As indicated above, only the impacts to land use and coastal infrastructure are identified as potentially "major."

American Petroleum Institute (continued)

API-10

by BOEM's assumption that certain mitigation measures will be imposed and obeyed by lessees, BOEM should nevertheless explain and rectify the apparent discrepancy between the impacts identified in Table 1 and those identified in the impact analyses contained in Chapter 4. This will help avoid confusion and ensure that the public and the decision-maker fully understand the anticipated environmental effects of the proposed lease sales.

For example, the matrix concludes that the impacts to deepwater benthic communities will be "negligible to minor" across all alternatives. Yet the impact analysis for deepwater benthic communities in Chapter 4.4 indicates that the potential impacts to benthic communities could be "major" *in* a number of respects unless "mitigation" is applied. *See* Table 4-6 at p. 4-96. Although BOEM discusses certain "protective measures" contained in nonbinding guidance documents such as Notices to Lessees, and pre-existing legal requirements that tend to minimize certain impacts to benthic communities, BOEM does not appear to point to any particular mitigation measure or combination of measures that would reduce the nominally potentially "major" impacts of the proposed action(s) on benthic communities to the "negligible to minor" level identified in the matrix at Table 1. In such situations, BOEM should clearly identify the mitigation measures it proposes to impose on OCS operators to achieve the desired impact level or, in the alternative, revise the level of anticipated impacts to reflect the possibility that the impact could be greater than that currently identified in the Alternative Comparison Matrix at Table 1.

<u>BOEM should clarify its analysis of "incomplete and unavailable information."</u>

API-11

BOEM should ensure that it applies the appropriate regulatory standard to its consideration of incomplete and unavailable information. The Council on Environmental Quality regulation at 40 C.F.R. § 1502.22 requires agencies to consider incomplete or unavailable information. When preparing an EIS, an agency must either obtain information that is "essential to a reasoned choice among the alternatives" or explain why such information is too costly or difficult to obtain. *Id.*, *Native Village of Point Hope*, 740 F.3d at 496.

BOEM deals admirably with the reality of incomplete or unavailable information throughout the DEIS, but in a few places it misstates the appropriate regulatory standard. For example, with respect to deepwater benthic communities, BOEM acknowledges that knowledge concerning deepwater benthic community composition, life cycles, and location is currently incomplete. See DEIS at p. 4-118. BOEM also acknowledges that "[d]etailed information on impact-producing factors [such as exposure to oil spill events] may be relevant to the evaluation of impacts on deepwater benthic communities." *Id.*, at 4-118 - 4-119. However, BOEM concludes that, *because* the agency used the "best available science to determine the range of reasonably foreseeable impacts," and "appl[ied] accepted scientific methodologies to…integrate existing information and extrapolate potential outcomes," "*[t]herefore*, BOEM has determined that the incomplete information is not essential to a reasoned choice among alternatives." *Id.* at 4-119. In numerous sections of the DEIS dealing with incomplete or unavailable information, BOEM reaches similar conclusions or no conclusion at all with respect to the "essential" nature of the incomplete and unavailable information. *E.g.*, DEIS at pp. 4-7 - 4-8 (discussing impacts associated with the *Deepwater Horizon* spill); 4-353 (assessing visual impacts, and making no finding with respect to whether the missing information is essential to a reasoned choice among the leasing alternatives).

BOEM's use of the best available science does not make essential information nonessential. To meet its requirements under 40 C.F.R. § 1502.22, BOEM must first determine

American Petroleum Institute (continued)

API-11

whether the missing information is essential to a reasoned choice among the alternatives. If BOEM determines that the missing information is essential, then the agency must determine whether the costs of obtaining the information are exorbitant or the means of obtaining it are not known. *Oceana v. BOEM*, 37 F. Supp. 3d 147 (D.D.C. 2014); *Native Village of Point Hope*, 740 F.3d at 495-497. If either is true, then BOEM must do precisely what it has done: explain that the information is incomplete or unavailable, explain the relevance of the incomplete or unavailable information, provide a summary of the existing science, and provide an analysis based on theoretical approaches or generally accepted research methods. 40 C.F.R. § 1502.22(b).

Although BOEM has supplied all the information and analysis it can where it perceives missing information, in some instances it has not determined whether the missing information is essential to a reasoned choice among the alternatives. Moreover, in some instances BOEM has not determined whether obtaining additional essential information is feasible. BOEM should clearly make the required determinations to ensure adherence with 40 C.F.R. § 1502.22.

BOEM should clarify its use of acronym "EIA" in the 2017 – 2022 Programmatic EIS versus the Multisale DEIS

API-12

In the Draft Programmatic Environmental Impact Statement (DPEIS) on the Outer Continental Shelf (OCS) Oil and Gas Leasing Program: 2017 – 2022 BOEM introduced the concept of Environmentally Important Areas and uses the acronym "EIA" when discussing them. Our review of the DEIS does not show any discussion of "Environmentally Important Areas." The DPEIS emphasized the importance of Environmentally Important Areas (EIAs) to the extent that they are the focus of the Alternative B (Reduced Proposed Program) approach, and BOEM has even provided a Fact Sheet to help explain these. Additionally, in discussing "Topographic Stipulation Blocks" in the Draft PEIS, these are considered among the "EIAs that could be geographically defined, were supported by adequate data, but would not affect the size or location of potential leasing." However, this DEIS does not consider EIAs specifically by name, but rather defines the acronym "EIA" as an Economic Impact Area (DEIS 3-79). In contrast, in this DEIS, Topographic Stipulation Blocks are considered in Alternative D because they "can be geographically defined, and adequate information exists regarding their ecological importance and sensitivity to OCS oil- and gas-related activities". The two definitions are very similar, which makes the EIA concept even more confusing and hard to justify its exclusion from the multi-lease EIS. Furthermore, the inclusion of Alternative D, which could exclude blocks subject to the Topographic Features Stipulation, is in direct contrast to the Draft PEIS, which identified them as not affecting the size or location of potential leasing.

BOEM is mixing the use these terms or dropping some terms altogether that were regularly used in he past(such Areas of Special Concern [AOCs]), which is confusing and should be clarified between the two documents.

AOCs, in particular, had been part of BOEM's NEPA vocabulary going back to 2002, which included federally managed areas (e.g., Marine Protected Areas, National Marine Sanctuaries, National Parks, and National Wildlife Refuges). AOCs in previous BOEM NEPA documents included locations that have been given special designations by Federal, State, and nongovernmental organizations (e.g., National Estuarine Research Reserves, National Estuary Program Sites, and Military and National Aeronautics and Space Administration [NASA] Use Areas) (see BOEM 2012 – 2017 OCS Oil and Gas Leasing Program DPEIS 3.9). Essential fish habitat as designated by the United States Department of Commerce (USDOC), National Marine

American Petroleum Institute (continued)

API-12

Fisheries Service (NMFS) was also included as an AOC in assessing impact levels for biological and physical resources (BOEM 2012 – 2017 DPEIS p.4-9), but discussed in BOEM technical whitepaper and not this DEIS.

The dual-use of EIA is confusing and should be clarified across each EIS. If BOEM is changing its terminology to replace AOCs with Environmentally Important Areas, additional discussion and explanation of this change is needed to reduce confusion going forward. API recommends that BOEM align the language across the DPEIS and this DEIS to eliminate unnecessary confusion and to provide an explanation of language clarification and the meaning of such terms in regards to impact analysis in each NEPA document. We also recommend that once BOEM aligns the language, that terminology remains consistent in any NEPA document associated with 2017 – 2022 OCS activities.

BOEM should include sufficient references

API-13

This DEIS generally lacks sufficient references for the included information. In many instances, BOEM refers to specific examples, occurrences, or data (See *Comments on specific areas of analysis*). When discussing marine mammals, BOEM references metrics provided from different Federal agencies (i.e. NMFS) and the describes potential impacts to populations without providing reference to quantitative metrics, peer reviewed literature or other sources to support the designation of an impact level or factor. In some cases, it seems that the information may originate from unpublished data, technical memorandums, whitepapers, surveys, etc. Regardless of the source, all information leading to conclusions of impact determinations should be referenced.

Comments on specific areas of analysis

In this section, API provides an overview of the environmental impact sections along with our general recommendations to improve clarity and specificity to comments or conclusions made by BOEM. Our general recommendations include the following:

API-14

1. Construct tables for each evaluated impact that it clearly links the impact determinations, specifically for ranges, and (individual and cumulative) data and conclusions with supported evidence and uncertainty for the resulting determination(s).

API-15

2. Clarify discrepancies in terminology between the 2017 – 2022 GOM Multisale EIS and the 2017 – 2022 Proposed Leasing Program Draft (and Final) Programmatic EIS (herein DPEIS).

The following sections address individual impact factors. API notes overall concerns and recommendations for improvement and follows these recommendations with comments to specific text references that BOEM should address.

Air Quality

The DEIS evaluates offshore and onshore air quality impacts attributable to a single GOM lease sale during the 2017-2022 program and "also considers baseline data in the assessment of impacts from a proposed action on the resources and the environment" (pg. xv). Overall the DEIS finds that individual lease sale contributions to cumulative impacts would be minor for Alternatives A, B, C, and D.

American Petroleum Institute (continued)

API-16 The DEIS air quality assessment suffers from a lack of specificity regarding the basis and criteria for establishing impact levels. The document does not include a tabulation of the emissions associated with the assessed lease sale scenario, or the corresponding lease block location. The document also fails to clearly establish where air quality impacts should be assessed, in many cases describing impact locations as "over the OCS and adjacent onshore areas." A description of offshore impacts is irrelevant because the OCSLA limits the authority of the Department of the Interior to impacts that threaten onshore compliance with the National Ambient Air Quality Standards (NAAQS).

API-17 Specificity is also lacking when BOEM uses non-qualifiers to describe what should be documented as qualitative or quantitative results. For example, terms such as "slight impact", "slight effect", and "very small" should be well defined to help clarify how these impacts contribute to the impact analysis. It is not clear how such qualifiers lead to determination of impact levels. API recommends that BOEM provide clarification in regards to what the terms represent and how these statements result in determination of a particular impact level:

→ *"The incremental contribution of a lease sale would have "slight impacts" on coastal nonattainment areas"*

→ *"The lease sales would have a "very small" impact on visibility impairment"*

API-18 The lack of specificity seen in the DEIS is common among BOEM NEPA analyses, but it is not uniform. Three lease sale EISs – covering lease sales 225, 226, 235, 238, 241, 246, 247, and 248 – estimate onshore criteria pollutant concentrations by assigning representative emissions to a representative lease block. Because this DEIS serves in support of the Multisale and Lease Sale 249 (taking place in 2017), it is not clear why this level of detail is not presented. In fact, in several places the DEIS air quality assessment alludes to this type of detailed analysis being conducted but does not include the specific results (page 4-27, for example, claims that an estimated emission inventory was compiled but does not present it). However, for 1-hr nitrogen oxides (NOx), a specific result seems to be provided. On p. 4-27, the DEIS claims that the 1-hour nitrogen dioxide (NO_2) standard has not been violated by any post-lease air quality modelling and, importantly, that the current regulations, reporting, and on-going monitoring will ensure that the NO_2 NAAQS is not violated.

API-19 In addition, the disparity between the conclusions of this document and the 5-Year Program DPEIS is confusing. This DEIS concludes air quality impacts are "minor", while the DPEIS concludes the air quality impacts of the 5-year program in the GOM will be "moderate". Our review shows similar analyses in both documents concerning potential impacts to onshore areas. That is, dispersion and mitigation have proven effective in reducing any threat (Wheeler 2008, DEIS at p. 4-27). This has been the consistent conclusion of multiple EIS's and modeling studies conducted by BOEM and its predecessors. API believes the DEIS analysis is correct based on the analysis presented. API recommends that BOEM clarify in each document why the disparity exists and that the 5-year Program PEIS include a distinction of impact by region, in which case would reflect the Multisale DEIS conclusion of "minor" for the GOM.

Specific Comments

API-20
- Pages 4-20 and 4-21: The scales in Figures 4-3 through 4-6 are misleading. For a common pollutant, the binned scales for non-platform and platform sources are inconsistent.

American Petroleum Institute (continued)

API-21
- Page 4-25: "The OCS emissions... would resemble past emissions inventories and are indicated in Figures 4-9 and 4-10." – Figures 4-9 and 4-10 show Gulfwide emission figures, not emission figures for a single lease sale. API recommends that BOEM provide additional clarity by stating the figures of OCS cumulative emissions or make it clear that the distribution of emissions across various platform sources would be expected to be similar.

API-22
- Page 4-25: "Platform and well emission were calculated using the integration of projected well and platform activities over time." – If this sentence describes the 2011 Gulfwide Emission Inventory, that should be stated.

API-23
- Page 4-27: "Potential impacts resulting from all of the above routine activities based on Year 2008 and Year 2011 OCS emission inventories, post-lease 1-hour NO_x modeling, and past studies are projected to be minor." Please provide reasoning for the "minor impact" determination and improve the clarity of this section.

Fishes and Invertebrates

API-24 It is at times difficult to link conclusions with the information presented in the DEIS. This is in part due to information that is presumably found in associated documents. While this is intended to facilitate brevity, it makes it difficult to identify the studies supporting findings. For instance, the potential impacts of a very large accidental release on Gulf resources are assessed in a separate document, *Essential Fish Habitat Assessment for the Gulf of Mexico*. However, it is unclear how the analysis from that white paper informed the DEIS. Furthermore, the lack of a clear linkage between the conclusion and supporting evidence makes it difficult to follow the identification of an issue and the impact determination of the respective issue. For instance, entrainment of fish eggs and larvae is identified as an issue early on, but is later identified as not an important issue. Moderate impacts to fish and invertebrates are associated with cumulative impacts. However, the moderate cumulative impacts due to sound and fisheries are based on an unknown amount of future impact due to activities unrelated to the OCS lease block that could range from negligible to moderate (i.e., population level impacts but which are not long-term). Given that this conclusion is extremely broad and is based on unknowns, API recommends that BOEM prepare a summary table and impact scores should better reflect the level of uncertainty and a predicted contribution from the OCS activities

Specific Fishes and Invertebrates Comments

API-25
- Page 4-185: Four impact producing factors were examined, including anthropogenic sound, bottom disturbing activity, habitat modification and oil spills. Notable exceptions were that magnitude of the potential impacts from all sounds combined (i.e., vessel traffic, exploratory drilling, geophysical activities, and offshore construction) would be minor for the Alternatives considered. Not included were produced water discharges and impingement and entrainment (from cooling water intake structures on the facility). The DEIS states impingement and entrainment were not considered based on limited exposure and/or response expected. The analysis showing that these factors are a limited exposure is not presented, even though two papers that support the analysis were mentioned on page 3-66 (i.e., LGL Ecological Research Associates Inc., 2009 and LGL Ecological Research Associates Inc., 20014), and the reader is referred to Chapter 4-7 for "[m]ore information on the specifics regarding potential impacts to fisheries…". Effluents and potential constituents of some effluents and the potential impacts from cumulative

American Petroleum Institute (continued)

API-25 discharges over the 50 year lease period should be discussed to substantiate their omission.

- API-26 Section 4-7 (p 4-184) - Why are surface waters only considered for icthyoplankton? On p. 4-187 only one life history category is considered (ictihthyoplankton). Concentration areas for fish eggs and larvae are described, particularly locations influenced by the Mississippi River. If these concentration points are widely distributed throughout the lease areas, this should be specified as Section 4.7.2 on p. 4-191 and 4.7.2.1 on page 4-202 indicate that the analysis assumes a non-random, even distribution of fish and invertebrates; otherwise the potential impacts to concentrations of eggs and larvae in portions of the Gulf should be discussed for each Alternative. API suggests that BOEM provide clarification as to why surface waters were only considered in the context of oil and gas impacts and non-oil and gas impacts.
- API-27 Page 4-200: For impacts due to OCS activities, the DEIS relies on the resource agencies to limit potential impacts from commercial and recreational fisheries. However, for cumulative impacts, the DEIS indicates that moderate impacts might be expected for areas/species that are overfished. The DEIS should be consistent in the role of resource agencies. In addition, the expression of impacts as moderate should clearly state that this is due to non-OCS impacts. Furthermore the offset from habitat/fish biomass that is provided by the presence of OCS structures in the Gulf should be mentioned.
- API-28 Pages 4-201 and 202: States that there could be moderate impacts due to unknowns only if the "impact-producing factor affects habitat or populations to an extent that would be expected to exceed natural variation in population abundance or distribution but not result in a long-term decline." This is the definition of moderate impacts. This should be caveated with the probability that OCS lease options would contribute to that potential moderate impact (e.g., although the contribution of OCS lease activities are predicted to be negligible to minor).

Birds and Protected Birds

API-29 As with the previous sections, it is difficult to link conclusions with underlying data. This is in part due to information that is presumably found in associated documents. API recommends that BOEM considers using a table as described at the beginning of this section to more clearly link conclusions with the data.

Moderate to major impacts for birds are associated with cumulative impacts. However, the higher impact rating is primarily due to non-OCS factors such as West Nile virus, predation by cats, and wetland subsidence (Page 4-220), whereas the potential impacts from the Deepwater Horizon, non-OCS oil and gas related factors and the minimization of OCS oil and gas-related impacts through lease stipulations and regulations were considered to be negligible (Page 4-218). Given that this conclusion is extremely broad and is based primarily on non-OCS related oil and gas activity impacts, the summary table and impact scores should better reflect the level of uncertainty and a predicted contribution (or lack thereof) from the OCS activities.

Specific Birds and Protected Bird Comments

- API-30 Page 4-306 "Impacts to protected species were deemed negligible to moderate if a protected bird species changes it normal migratory behavior due to artificial lighting". API recommends that BOEM provide more scientific justification and references to

American Petroleum Institute (continued)

API-30 better explain this moderate rating should be better explained or suggest that BOEM down-rate to minor.

Protected Species - Marine Mammals and Sea Turtles

API-31 The Impact Producing Factors section (Section 3.1.2.1 p. 3-10) provides a reasonable, but brief, summary of geological and geophysical (G&G) operations with references to the Atlantic G&G PEIS and a GoM G&G PEIS currently being developed. Although an exhaustive review of G&G activities may not be necessary, it would be appropriate from BOEM to provide a greater level of detail in this EIS, especially descriptions that are relevant to recent survey activities in the GoM. More importantly, the text in this DEIS only describes the activities themselves and does not review available information on the mechanisms of potential impacts to relevant species. Such information for marine mammals is not present in this section nor is it present in the Impact Analysis section (4.9.1.2). A more detailed review and analysis of potential impacts from G&G activities resulting from lease sales are warranted, even if such analyses are, or will be, available in other NEPA documents. API recommends that BOEM consider adding this level of detail before the Multisale EIS is finalized in June 2017 and before the Lease Sale 249.

Section 4.9 'Protected Species' of the DEIS provides a short overview of GOM marine mammals (Section 4.9.1) and sea turtles (Section 4.9.2) regulations, and (sub)population status as part of a description of the affected environment and impact analysis. Potential impacts to marine mammals and sea turtles are briefly described within 'Environmental Consequences' Section 4.9.1.2, and 4.9.2.2, respectively. Activities that may cause potential impacts include routine, geological, geophysical, transportation, discharge, waste, and marine debris. The DEIS estimated degree of expected impact(s) on marine mammals and sea turtles from each of these activities and considers the effectiveness of planning, mitigation and enforcement.

API-32 The marine mammal population estimates provided in Table 4-14 are appropriately taken from the NMFS Stock Assessment Reports (Waring et al. 2014). Recently released habitat-based density and population estimates (Roberts et al. 2016) are not included in the table or in the following text describing individual species. Excluding them from the table is appropriate, although some discussion of those estimates would be appropriate to add to the text of the following section, especially for consistency with other BOEM NEPA and MMPA related documents currently in production or review. Along with the population estimates, the Potential Biological Removal (PBR) estimates are provided and the calculation of PBR is described in the text. However, the PBR estimates are not referred to later in this section and it is unclear what the purpose of their inclusion is. The use of PBR for an effects analysis from offshore oil and gas activities is inconsistent with the purpose for which PBR is calculated (assessing impacts of mortalities from incidental fisheries takes). API recommends that BOEM clarify what the purpose is for including PBR estimates, as well as an explanation and justification for why NMFS Stock Assessment Reports were used versus habitat-based density and population estimates.

API-33 The resultant expected impacts are described as ranges for marine mammals. For example, the expected impacts from transportation range from negligible to major. It is unclear why different subsections use different examples. Based on the examples provided, the impact level determination appears to be based primarily on the population estimate of the species concerned. However, using the three impacts above, it is unclear why two are ranked as Negligible to Major, whereas the other is ranked as Negligible to Moderate (Table 4-13, p. 4-

American Petroleum Institute (continued)

API-33

227). There is insufficient justification for the upper level limit of Major for "Marine Trash and Debris" and "Transportation (vessel strikes)" impacts, while the upper level limit is moderate for "Decommissioning (explosive severance)" impacts. Any impact-producing factor that could result in serious injury or mortality could be classified as either major or moderate depending on the species involved. In the subsection on decommissioning (p. 4-246), the EIS further states: "Therefore, depending on the population estimate of any given species, explosive severance methods could have a major impact." So it is unclear why this factor was given an upper limit impact level of moderate. The difference cannot be accounted for by mitigation because all three of these activities have regulated mitigations. Are the respective mitigations for vessel strikes (i.e., NTL 2012-JOINT-G01, Vessel Strike Avoidance and Injured/Dead Protected Species Reporting) and marine trash and debris (i.e., NTL 2012-BSEE-G01, Marine Trash and Debris Awareness and Elimination) less effective than those for decommissioning (i.e., NTL 2010-BSEE-G05, Decommissioning Guidance for Wells and Platforms)? In all three cases, the EIS suggests that with mitigation "the reasonably foreseeable" impact would be Negligible. API recommends that BOEM consider our recommendations regarding clarification of certain aspects of the cumulative impacts analysis and "impact-producing factors".

API-34

Thorough descriptions of the two ESA listed species (Sperm whale and West Indian manatee) are provided, but descriptions of the remaining 19 species of marine mammals are grouped by taxonomic family and are very limited. At this high taxonomic level, only the most basic feeding habits and distributional information is provided. No information about what is known about current impacts from oil and gas activities in the GOM is presented, nor are the descriptions adequate to evaluate the likelihood of activities on future leases causing additional impacts. The subsequent text in this section does not provide any actual analysis of potential impacts to specific species and such information is not presented in the Impact Producing Factors section (3.1) either. While politically and practically convenient, using the U.S EEZ limits to define the southern extent of the NGOM (in terms of how populations and ranges are managed) is not functionally appropriate. Most of the species either travel to, or rely on seasonal resources from, other parts of the GOM.

API-35

When comparing potential impacts from the Alternatives, the first paragraph states that "While the WPA is a smaller area with less projected activity than is proposed for the CPA/EPA (refer to Chapter 3), marine mammal species are widely distributed throughout the planning areas. As such, activities isolated to specific planning areas pose similar potential impacts to populations as do activities occurring in all planning areas. Therefore, because of the diversity and wide distribution of species in the Area of Interest, the level of impacts would be the same for *Alternatives* A, B, C, and D". Even though marine mammal species are widely distributed and often highly mobile (especially deep-water species), because Alternatives B and C would exclude very large areas of the GOM from leasing it is hard to justify that potential impacts from those alternatives would be just as great as under Alternatives A or D. It seems only logical that impacts may be reduced if new leasing-related activities were not to occur over such large areas. This same argument is present in the first paragraph of section 4.9.1.2.1 on page 4-265. API recommends that BOEM specifically provide further justification to support this conclusion and if the evidence exists to make the distinction between Alternatives. As stated in previous comments, API also recommends that BOEM provide additional clarity and explanations in more comprehensive form that shows potential impacts to all species in the GOM to provide clear linkages between findings and determination of impacts (individual and cumulative).

American Petroleum Institute (continued)

Specific Marine Mammal Comments

Multi-species

API-36

- Section 4.9.1.1 – This section provides very specific examples of the different individual impact levels to marine mammals when discussing the various impact-producing factors. These are noted below by species. What is not clear is how these individual levels and factors are weighed in the level determinations and there is often not clear data or references provided to support the likelihood of such impacts occurring the GOM.

API-37

- Table 4-14 (p. 4-229) – The table provides the "best available" population estimates for marine mammal species in the northern Gulf of Mexico. The source of these estimates is NMFS stock assessment reports (Waring et al. 2014). However, NMFS has stated the agency's acceptance of the use of Roberts et al. (2016) habitat-based cetacean density models as the more recent and best estimates of population. Conflicting datasets could result in differences in agencies' metrics (e.g., take estimates, PBR, etc.). Furthermore, discrepancies in the ranges of different population metrics could inadvertently inflate an qualitative impact level analysis if BOEM is considering a particular metric that may or may not be calculated using a different population estimate (e.g. Roberts et al. versus Waring et al.). The agencies' need to agree on estimates of populations and stocks in order to adequately assess impact levels and factors that will lead to aligned decision-making and are mutually supported by the best available science.

API-38

- Section 4.9.1.2 (p. 4-241) The section describing potential impacts from G&G Activities is extremely brief. Several primary literature sources are referenced, but there is little to no summary of them. There is no real analysis of the mechanism of impact from G&G survey sounds or justification for why those impacts would results in negligible to moderate impacts. As BOEM has stated in public documents (i.e. August 2014 BOEM Science Note), "there is no documented scientific evidence of noise from air guns used in G&G seismic activities adversely affecting marine mammal populations or coastal communities." References to additional information available in other NEPA documents are insufficient justification especially when that other document was prepared for Atlantic OCS planning areas. Also, this section references a technical paper "National Standards for a Protected Species Observer Program" (Baker et al. 2013) as if it has the force of regulation. This is not true as implementation of those standards in the form of regulations has not yet occurred. API recommends that BOEM make this clarification in the Final EIS and continues to document potential impacts, or lack thereof, in the final Multisale EIS and future GOM NEPA documents.

API-39

- Section 4.9.1.2 (p. 4-241) – "Marine mammals can become entangled in some types pf lines associated with G&G (Geological and Geophysical) activities." References are needed.

API-40

- Section 4.9.1.2 (p. 4-241) – *Transportation* – The analysis of impact from Transportation, primarily the potential impacts from vessel strikes, includes very little GOM specific vessel-strike information except in the case of manatees and possibly sperm whale. The text references NTL 2012-JOINT-G01 which requires operators to report observations of injured or dead protected species. API recommends that BOEM summarize the results from these reports so the current level of impact from O&G activities could be understood and the relative impacts from future years placed into context.

American Petroleum Institute (continued)

API-41

- Section 4.9.1.2 (p.4-241) *Transportation cont.* – The last two sentences of the first paragraph, which are: "Nowacek and Wells (2001) found that bottlenose dolphins had longer interbreath intervals during boat approaches compared with control periods (no boats present within 100 m [328 ft]) in a study conducted in Sarasota Bay, Florida. They also found that dolphins' decreased interanimal distance, changed heading, and increased swimming speed significantly more often in response to an approaching vessel than during control periods." These are very specific statements that appear only peripherally related to the topic at hand. The implication seems to be that ship presence can cause behavioral reactions, but BOEM does not state this explicitly or explain why these statements are made. API recommends that BOEM clarify why these statements are included.

Pantropical Spotted dolphin

API-42

- Section 4.9.1 (p. 4-246) – "For example, if a group of pantropical spotted dolphins (population estimate of 50,880 individuals) were not detected prior to a detonation and experienced physical injuries or mortalities, it would have a localized and irreversible impact on that group of individuals, but it would not diminish the continued viability of the population." BOEM needs to explicitly state what a group size is to support the conclusion stated. Again, this relates back to the mixed use of population estimates between agencies and the more important determination is the ratio between group and population that indicates the impact (or no impact) to the population.

West Indian Manatee

API-43

- Section 4.9.1 (p. 4-229 Table 4-14) – West Indian Manatee (Population Estimate – 6063, PBR – Undetermined). How was this NGOM population estimate of 6,063 derived – does it include animals that live on the East coast of Florida? It is not clear in this document. API recommends that BOEM include in-text references to clarify the sources for the estimates.

API-44

- Section 4.9.1 (p. 4-236) – Description of Sirenia. For practical purposes, this species should be divided into the two sub-species: Florida manatee and Antillean manatee. The cooler NGOM winters are considered a barrier contributing to the genetic isolation between these two populations (USFWS).

Sperm Whale

API-45

- Section 4.9.1.1 (p. 4-231) – "The NMFS considers sperm whales in the GOM as a distinct stock in the Marine Mammal Stock Assessment Report (Waring et al. 2014), and research supports this distinction from the Atlantic and Caribbean stocks…" The NGOM sperm whale population is not an isolated genetic stock. While not a common occurrence, there is some evidence that adult male NGOM sperm whales travel seasonally trough the Florida straits into the NW Atlantic Ocean. One adult male travelled to the North Atlantic and then back into the Gulf after about two months. From Engelhaupt et al. (2009) in NOAA 2012, it states that "[a]nalysis of biparentally inherited nuclear DNA showed no significant difference between whales sampled in the Gulf and those from the other areas of the North Atlantic, indicating that mature males move in and out of the Gulf." ." It is also documented that the spatial distribution of GOM sperm whales is correlated with mesoscale oceanic physical circulation features (Biggs et al. 2005). Features include

American Petroleum Institute (continued)

API-45

Loop Current and its eddies, which can locally increase primary production and prey availability. While the Loop Current exhibits long-term circulation trend, it also exhibits significant yearly interannual seasonal variability in the number of eddies shed (Chang and Oey, 2012 and Hall, 2012) and the movement and persistence of those eddies moving westward across the central to western GOM OCS and shelf (Sturges and Leben, 2000). Loop Current and its eddies are a natural mechanism that could naturally change sperm whale distribution, which is not included as an additional non-oil and gas factor. API recommends that BOEM consider the movement of sperm whales in the final GOM Multisale EIS and document movement in regards to the impact range levels and potential impacts that broad movement might have, or lack thereof, on determining impacts from oil and gas and non-oil and gas factors, including, but not limited to, ship strikes (documented by NOAA Office of Protected Resources species webpage) and physical oceanographic circulation features.

API-46

- Section 4.9.1.2 (p. 4-242) – Vessel Strikes are mentioned multiple times throughout this document as a source for human-activity related mortality. Aside from manatee collisions with vessels in coastal regions, are marine mammal-vessel interactions an issue for the offshore NGOM regions? Collisions with vessels are a main cause of North Atlantic right whale mortality but North Atlantic right whales are not considered as a NGOM species in this report. As previously mentioned in regards to sperm whales, API recommends that BOEM include citations from known ship strike mortality of cetaceans in the GOM.

Protected Species – Sea Turtles

Loggerhead Turtle

API-47

- Section 4.9.2.1 (p. 4-268) – "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 1000-m isobaths" and Section 4.9.2.1 Page 4-269 – "Subadult and adult loggerheads are primarily coastal…" These two statements appear to be in disagreement. Is it the very young turtles that are sighted over the OCS and beyond? What is the definition of "coastal" here? API recommends that BOEM include a definition of "coastal" in the context to the discussion noted here. We further suggest that the definition of "coastal" be written in the context of water depth and region designations throughout the Multisale EIS and DPEIS to maintain consistency in terminology.

Kemp's Ridley Sea Turtle

API-48

- Section 4.9.2.1 p. 4-271) – "In the GOM, juvenile/subadult Kemp's ridleys occupy shallow, coastal regions." API recommends that BOEM include references to this statement.

Green Sea Turtle

API-49

- Section 4.9.2.1 (p. 4-272) – "Green sea turtle mating occurs in the waters off the nesting beaches. Each female deposits 1-7 clutches (usually 2-3) during the breeding season at 12- to 14-day intervals. Mean clutch size is highly variable among populations but averages about **110** eggs." Is the above information attributed to Balazs 1983[2]? If so,

→ [2] Balazs, G. H. 1983. Recovery records of adult green turtles observed or originally tagged at French Frigate Shoals, Northwestern Hawaiian Islands. U.S. Dep. Commer., NOAA Tech. Memo. NOAA-TM-NMFS-SWFC-36, 42 p.

American Petroleum Institute (continued)

API-49

API recommends that BOEM it needs to be properly cited in the text and clarify exactly what the reference, if not from Balazs 1983 refers to. The Balazs reference represents life history data for the Hawaiian Islands Region – not the NGOM. Further, Balazs 1983 is dated and does not represent current conditions.

API-50

- It would be better for BOEM to refer to Hart et al 2013 for green turtles in the Dry Tortugas (Southern GOM), which states that, "The nesting season for green sea turtles lasts throughout the summer but is most concentrated in June and July. During nesting season, females nest at roughly 2-week intervals, producing an average of five nests or "clutches." Each clutch contains an average of **135** eggs, which will hatch after incubating for about 2 months

Sea Turtle Critical Habitat

API-51

- Section 4.9.2.1 (p. 4-276) – "Schwartz (1988) reported numerous loggerhead hatchling during commercial trawling for Sargassum in the Atlantic." Are there any NGOM relevant references for this distribution? Or does this imply that the same green turtle hatchlings found offshore in the Atlantic Ocean are also found at later stages in the NGOM – this is important to know and API recommends that BOEM make this clear in the final EIS.

API-52

- Section 4.9.2.2 (p. 4-278) – "Stranding data for the U.S. Gulf and Atlantic Coasts, Puerto Rico, and the U.S Virgin Islands show that, between 1986 and 1993, about 9 percent of living and dead stranded sea turtles had boat strike injuries (Lutcavage et al. 1997). Given the limitations of the baseline ecological data, it is important to discern the differing levels of threats in the difference environments – API recommends that BOEM review NGOM-only records and better clarify the potential non-oil and gas impacts that could be threats to sea turtles.

API-53

- Section 4.9.2.2 (p. 4-279) –*Transportation* - "Given the scope, timing, and transitory nature of a proposed action and with this established mitigation, the impacts to sea turtles from vessel collisions are expected to be negligible; however, if the collisions occur, impacts could be moderate." This statement is confusing. API recommends that BOEM clarify by answering the following questions:, How many collisions would constitute a moderate impact? A moderate impact to which species? Moderate in terms of the damage to a particular animal or population? – The DEIS describes the expected low risk of vessel-turtle collision and a history of no recorded vessel-turtle collisions in the GOM; but the degree of risk is lost in the impact analysis.

API appreciates the opportunity to comment on the Multisale DEIS. Should you have any questions on these comments please contact me at (202) 682-8584 or by email at radforda@api.org.

Sincerely,

Andy Radford

Andy Radford

Care2Petition

6/7/2016 DEPARTMENT OF THE INTERIOR Mail - Fwd: Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

BISON CONNECT

Rucker, Helen <helen.rucker@boem.gov>

Fwd: Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

1 message

Multisale EIS 2017-2022, BOEM <multisaleeis2017-2022@boem.gov> Tue, Jun 7, 2016 at 7:45 AM
To: Helen Rucker <helen.rucker@boem.gov>, Gary Goeke <gary.goeke@boem.gov>, Tershara Matthews <tershara.matthews@boem.gov>, Ross Del Rio <ross.delrio@boem.gov>

Note the attachment

---------- Forwarded message ----------
From: **Aaron Viles** <aaronv@care2team.com>
Date: Mon, Jun 6, 2016 at 5:53 PM
Subject: re: Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022
To: multisaleeis2017-2022@boem.gov

Foytlin-Care2Petition-LeaseSales2017-2022.pdf

I'm submitting the attached Care2 petition on behalf of its author, Cherri Foytlin. The petition has been signed by over 132,000 Care2 members

The text of the petition reads:

On April 12, 2016 Shell Oil released over 80,000 gallons of oil into the Gulf of Mexico, creating a slick that stretched over 13 miles, and endangering threatened sea turtles, whales, and other important marine life.

Those who love the Gulf Coast ask our leaders in DC - "Again?"

How long will we suffer the ongoing abuses of this dirty, dangerous industry? As you consider offering 92.2 million MORE acres of the Gulf to oil and gas exploration and development we urge you to consider this and all the spills created by the industry, especially the 2010 BP drilling disaster.

Spills such as these demonstrate the dire impacts the industry can and will continue to bring to the Gulf. Even without spills, slicks and sheen, we know the carbon pollution linked to new oil and gas development will doom our coast and communities.

CARE2 PETITION-1

Any new oil development must follow through on President Obama's promise to "change the

https://mail.google.com/mail/u/0/?ui=2&ik=ebe3f4902e&view=pt&search=inbox&th=1552ae5e6875e924&siml=1552ae5e6875e924 1/2

Care2Petition (continued)

CARE2 PETITION-1

way we manage our oil and coal resources so that they better reflect the costs they impose on taxpayers and our planet."

It's time to more appropriately balance the needs of the environment, the coast, the climate and our communities - your current assessments fail to do this. Cancel these lease sales now!

You can find the petition online here:
http://www.thepetitionsite.com/689/336/066/enough-shells-new-spill-shows-oils-cost-nonewleases/

--
Aaron Viles
Senior Grassroots Organizer, Care2

Extraordinary things happen when people who care take action together

- Create a petition today!
- Care2 is a certified B Corporation, using the power of business as a force for good.

Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective

• Center for Biological Diversity • Bold Louisiana •
• Gulf Restoration Network • Louisiana Bucket Brigade •
• Radical Arts and Healing Collective •

Via Regulations.gov and Electronic Mail

June 6, 2016

Gary D. Goeke
Bureau of Ocean Energy Management,
Gulf of Mexico OCS Region
Office of Environment (GM 623E)
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394
multisaleeis2017-2022@boem.gov

RE: Draft Environmental Impact Statement for Outer Continental Shelf Oil and Gas Leases in the Gulf of Mexico from 2017–2022; Docket No. BOEM-2016-0009

Dear Mr. Goeke,

CBD, BL, GRN, LBB, RAHC-1

The Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, and the Radical Arts and Healing Collective submit the following comments to the Bureau of Ocean Energy Management ("BOEM") on the Draft Environmental Impact Statement for Outer Continental Shelf Oil and Gas Leases in the Gulf of Mexico from 2017–2022 ("Draft EIS").[1] BOEM's proposal to lease over 70 million acres of the Gulf of Mexico so that oil and gas companies can drill up to 9.5 billion barrels of oil equivalent over the next 70 years will deepen the climate crisis and reverse course on President Obama's commitment to combat climate change. We therefore urge BOEM to halt all new oil and gas lease sales in federal waters and keep these dirty fossil fuels in the ground.

BOEM's mandate under the Outer Continental Shelf Lands Act ("OCSLA") to ensure that offshore oil and gas development is balanced "with protection of the human, marine, and coastal environments," and that BOEM consider "national needs" in making decisions under OCSLA,[2] requires BOEM to limit the climate change effects of its actions. This is particularly true considering that BOEM has already leased more than 22 million acres of the Gulf of Mexico to oil companies. Adopting the no-action alternative and ending all new offshore oil and gas leases would prevent billions of tons of greenhouse gas pollution and limit the destructive effects associated with drilling for and burning oil and gas extracted from our oceans.

In addition to worsening the effects of climate change, BOEM's proposal will cause a wide variety of other threats to public health and the environment including oil spills that would

[1] 81 Fed. Reg. 23,747 (Apr. 22, 2016).
[2] 43 U.S.C. §§ 1802(2), 1332(3).

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be nearly impossible to clean up; harmful air and water pollution; and further negative impacts to already imperiled wildlife and local communities. Offshore oil and gas exploration, development and production are inherently dangerous and it is time the administration transitioned the nation away from this toxic practice.

At the very least, BOEM must substantially revise its Draft EIS and reissue the document for public comment. BOEM's Draft EIS reflects a fundamental failure to comply with basic requirements of OCSLA; fails to adequately define the purpose and need; fails to properly define the environmental baseline; and fails to take a "hard look" at the impacts of its proposal by failing to consider the impacts from refining and burning the oil and gas to be extracted, impacts from offshore fracking and acidizing, and impacts from catastrophic and routine oil spills. The Draft EIS also fails to adequately consider cumulative impacts; fails to consider an adequate range of alternatives; and fails to adequately consider environmental justice issues. In short, the Draft EIS is woefully inadequate and does not meet the legal requirements of the National Environmental Policy Act ("NEPA").

I. BOEM's Area-Wide Lease Sale Approach Violates OCSLA

CBD, BL, GRN, LBB, RAHC-2

As courts have made clear, OCSLA's procedures for authorizing oil and gas activities on the OCS "are pyramidic in structure, proceeding from broad-based planning to an increasingly narrower focus as actual development grows more imminent."[3] Thus, the first stage—the five-year planning stage—has "important practical and legal significance," including its role as the basis for "future planning."[4] As such, Section 18(a) expressly requires BOEM to prepare a leasing program that consists "of a schedule of proposed lease sales indicating, *as precisely as possible, the size, timing, and location of leasing activity*."[5]

But rather than "precisely" defining the location of lease sales, BOEM's Proposed Program takes an area-wide approach that designates the entire Gulf of Mexico as the area eligible for lease sales. This area-wide lease sale approach is incompatible with OCSLA. Indeed, under this approach, BOEM is allowing the oil industry to determine which areas are explored and developed, thereby abdicating the agency's responsibility under OCSLA to direct oil activities and assure that they do not cause environmental harm.[6]

BOEM's area-wide lease sale approach is particularly troubling considering that this approach has been cited as one of the problems in the offshore oil regime that led to the Deepwater Horizon oil spill. In response to the spill, President Obama established the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling ("Commission") as an independent, nonpartisan entity charged with providing a thorough analysis of the causes of

[3] *California v. Watt*, 668 F.2d 1290, 1297 (D.C. Cir. 1981).
[4] *Id.* at 1299.
[5] 43 U.S.C. § 1344(a) (emphasis added); *see also Watt*, 668 F.2d at 1304 (OCSLA "unambiguously directs the [Bureau] to specify the location of leasing activity 'as precisely as possible.'").
[6] *See* 43 U.S.C. § 1344(a) (requiring *the Bureau* to precisely define where lease sales occur); *id.* § 1802(2) (requiring that oil and gas activities be balanced "with protection of the human, marine, and coastal environments").

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the disaster and recommending reforms for making offshore drilling safer.[7] The Commission issued its final report in January 2011, in which it highlighted the need for a fundamentally different approach to management of offshore drilling.[8] The Commission noted that the area-wide approach favored industry at the cost of meaningful environmental analysis. According to the Commission:

> OCS lease sales cover such large geographic areas that meaningful NEPA review is difficult. A decision to dramatically increase the size of lease sales—known as area-wide leasing—was made over 20 years ago at the request of industry; it has necessitated environmental analyses of very large areas at the lease sale stage. For example, the Final Environmental Impact Statement for the 2007–2012 multi-lease sales in the Gulf of Mexico covered more than 87 million acres, while the Final Environmental Impact Statement for Chukchi Sea Lease Sale 193 covered about 34 million acres. Given that 2008 lease sales in the Central Gulf of Mexico and the Chukchi Sea attracted almost $3.7 billion and almost $2.7 billion in high bids, respectively, it is appropriate to conduct environmental reviews on a finer geographic scale before private-sector commitments of this magnitude are made to purchase leases.[9]

However, BOEM's current proposal does just the opposite. In fact, it backslides from prior programs with respect to lease sales in the Gulf of Mexico. While previous programs have established lease sales based on the three separate planning areas—the Western Gulf, the Central Gulf and the Eastern Gulf—BOEM is now proposing to hold two lease sales per year in unleased portions of the "Gulf of Mexico." But the Gulf of Mexico contains nearly 160 million acres, more than 70 million of which are currently unleased and available for lease under BOEM's proposal. The Gulf also contains a great diversity of environmental and socioeconomic characteristics.

For example, as BOEM has repeatedly admitted, the separate regions in the Gulf of Mexico have distinct ecological features. The Western Region "hosts the northernmost tropical coral reef system in the United States at the Flower Garden Banks, an isolated system of predominately encrusting corals atop salt dome formations."[10] The system attracts reef fishes and large open-water species such as hammerhead and whale sharks.[11] The Western Region is also "home to some of the most important nesting sites for the endangered Kemp's ridley sea turtle."[12] The Central Region is home to a resident population of endangered sperm whales, and the Eastern Region includes manatee habitat.[13] And the Louisiana coastline contains a variety of

[7] *See* Weekly Address: President Obama Establishes Bipartisan National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, May 22, 2010, https://www.whitehouse.gov/the-press-office/weekly-address-president-obama-establishes-bipartisan-national-commission-bp-deepwa (last visited Mar. 23, 2015).
[8] National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling* (Jan. 2011) at 261, http://www.gpo.gov/fdsys/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION.pdf.
[9] *Id.* at 262.
[10] *See e.g.*, Draft Proposed Program for 2017 to 2022, at 6-11.
[11] *Id.*
[12] *Id.* at 6-24.
[13] *Id.*

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wetlands that make up one of the largest deltas in the world.[14] Moreover the line between the Western and Central Region and the Eastern Region follows the De Soto Canyon off the coast of Alabama and traces the eastern edge of the Loop Current, which effectively divides the Gulf.[15] In other word's the Gulf's size and variation clearly requires greater specificity in the size and location of lease sales.

BOEM states in its Draft EIS that the agency is proposing an area-wide approach to provide greater flexibility to industry and balance agency workload.[16] However, BOEM does not have "carte blanche to wholly disregard a statutory requirement out of convenience."[17] Nor can it abdicate its statutory duties under OCSLA or NEPA to appease industry. The designation lacks the precision required by the statute and is therefore unlawful.[18]

Moreover, in its Draft EIS, BOEM states that it will no longer conduct a supplemental EIS for each lease sale in the Gulf of Mexico.[19] Instead, BOEM says it will supplemental its Multisale EIS once per calendar year.[20] According to BOEM, this approach is necessary because the short-time frame between lease sales proposed from 2017 to 2022 does not provide sufficient time to prepare an EIS.[21] But this is a product of the agency's own making. There is absolutely no reason BOEM must hold multiple lease sales per year. Indeed, BOEM's new approach appears to violate its duties under OCSLA to comply with NEPA and the Endangered Species Act ("ESA") at every stage of the offshore oil and gas authorization process and its duty to ensure offshore developments is balanced with environmental safeguards and protection of the human, marine, and coastal environments.[22] BOEM's new approach also directly contradicts the Commission's express recommendations that BOEM conduct environmental reviews on a finer geographic scale.

II. BOEM's Purpose and Need Statement Fails to Comply with NEPA

CBD, BL, GRN, LBB, RAHC-3

BOEM's purpose and need statement fails to comply with NEPA. NEPA's implementing regulations provide that an EIS should "specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action."[23] This purpose and need inquiry is crucial for a sufficient environmental analysis because "[t]he stated goal of a project necessarily dictates the range of 'reasonable' alternatives."[24] Thus, "an agency cannot define its objectives in unreasonably narrow terms" without violating NEPA.[25]

[14] Draft EIS at 3-188.
[15] *Id.*
[16] Draft EIS at 2-5.
[17] *Ctr. for Biological Diversity v. U.S. Dept. of the Interior*, 563 F.3d 466, 488 (D.C. Cir. 2009).
[18] *See Watt* 668 F.2d at 1304 (stating that while "a leasing program consisting of a schedule of proposed lease sales designated as merely . . . 'Gulf of Mexico' . . . may . . . place the entire nation on notice, they hardly satisfy the requirement that the location of leasing activity be specified 'as precisely as possible.'").
[19] Draft EIS at 1-9.
[20] *Id.*
[21] *Id.*
[22] *See e.g.* 43 U.S.C. § 1802(2); *Village of False Pass v. Clark*, 733 F.2d 605, 609 (9th Cir. 1984).
[23] 40 C.F.R. § 1502.13.
[24] *Carmel-by-the-Sea v. U.S. Dep't of Transp.*, 123 F.3d 1142, 1155 (9th Cir. 1997).
[25] *Id.*

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BOEM's stated purpose and need for its proposal is "to offer for lease those areas that may contain economically recoverable oil and gas resources" in order to manage the development of oil and gas resources on the OCS.[26] This purpose and need is too narrow and thus inadequate because BOEM necessarily considered an unreasonably narrow range of alternatives. By framing its statement as needing to auction off areas of the OCS that might contain recoverable oil and gas, BOEM necessarily makes auctioning off *all* of the Gulf of Mexico not under moratorium, i.e., the proposed alternative, the only way to meet such a need. But OCSLA charges the Bureau with ensuring that "environmental safeguards" are in place for offshore oil development and ensuring the "balance [of] orderly energy resource development *with protection of the human, marine, and coastal environments*" and "national needs."[27] Accordingly, BOEM should have focused its purpose and need inquiry on objectives that comport with these statutory duties.[28] This is particularly true considering that BOEM has already leased more than 22 million acres of the Gulf of Mexico to oil companies, and U.S. commitments to limit greenhouse gas emissions to help prevent the most catastrophic impacts of climate change.

Moreover, NEPA evaluation must take place "*before* decisions are made."[29] Such an approach ensures that agencies will take the requisite "hard look" at environmental consequences *before* approving any major federal action.[30] But BOEM's purpose and need statement indicates that it did just the opposite. In other words, the statement demonstrates that BOEM already made the decision hold offshore oil and gas leases across all of the Gulf of Mexico and that its entire analysis was framed in a way to support that pre-determined outcome. BOEM's backward approach reflects a fundamental misunderstanding of its legal obligations and an apparent desire to appease the oil industry at the expense of our ocean environment and climate.

III. BOEM Failed to Properly Define the Environmental Baseline

CBD, BL, GRN, LBB, RAHC-4

BOEM's Draft EIS fails to properly define baseline conditions. NEPA requires BOEM to "describe the environment of the areas to be affected or created by the alternatives under consideration."[31] Thus, the establishment of the baseline conditions of the affected environment is a fundamental requirement of the NEPA process. "Without establishing the baseline conditions which exist in the vicinity . . . there is simply no way to determine what effect the proposed [project] will have on the environment and, consequently, no way to comply with NEPA."[32]

BOEM lacks critical information regarding the effects of the Deepwater Horizon oil spill on the Gulf of Mexico. The Deepwater Horizon disaster resulted in the deaths of 11 workers and caused a spill of approximately 206 million gallons of oil over the course of at least 87 days. More than 1,000 miles of shoreline were contaminated with oil; 88,522 square miles of ocean

[26] Draft EIS at 1-5.
[27] 43 U.S.C. §§ 1332(3), 1802(2)(B) (emphasis added), 1332(3).
[28] *See Citizens Against Burlington, Inc. v. Busey*, 938 F.2d 190, 196 (D.C. Cir. 1991).
[29] 40 C.F.R. § 1500.1(a) (emphasis added).
[30] *Kleppe v. Sierra Club*, 427 U.S. 390, 410, n. 21 (1976), *see also* 40 C.F.R. § 1502.5 (analysis must "not be used to rationalize or justify decisions already made").
[31] 40 C.F.R. § 1502.15.
[32] *Half Moon Bay Fisherman's Mark't Ass'n v. Carlucci*, 857 F.2d 505, 510 (9th Cir. 1988).

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totaling one-third of the Gulf of Mexico—were closed to commercial and recreational fishing; millions of animals were killed or harmed; and local residents were sickened.

Six years later, the Gulf is still reeling from the effects of the spill. Recent studies demonstrate severe lung disease in dolphins; near-record lows of critically endangered Kemp's ridley sea turtle nesting; oil dispersants toxic to corals and jellyfish; and a "bathtub ring" of oil on the seafloor.[33] Another recent study published in April 2016 indicates that the spill impacted 19% more coastline that originally believed, finding that oil washed up on 1,313 miles of coastline along the Gulf of Mexico.[34] In addition, the 50,000 people involved in cleanup efforts suffer from an increased risk of physical and psychological injury.[35] Gulf residents are still suffering from increased symptoms of depression, anxiety, mental illness, and posttraumatic stress.[36]

However, the impacts of the spill are not yet fully understood and are still being studied. For example, the Natural Resource Damage Assessment, which will assess impacts to natural resources that may have been impacted by the spill (including clean-up efforts), is still underway. Moreover, BOEM has repeatedly admitted in other environmental review documents that there are data gaps regarding numerous resources in the Gulf of Mexico, including wetlands, coastal water quality, offshore water quality, air quality, commercial and recreational fishing and environmental justice, and that the impacts of the Deepwater Horizon oil spill on such resources may have changed baseline conditions.[37]

Further, while BOEM reinitiated Section 7 consultation under the ESA following the Deepwater Horizon oil spill, BOEM has yet to complete that consultation.[38] Accordingly, BOEM does not have an accurate picture of the effects that authorizing more offshore oil and gas drilling (including in the very same area where the Deepwater Horizon spill occurred) could have on already imperiled species.

Moreover, BOEM's analysis of baseline conditions regarding water quality is fundamentally flawed. BOEM's Draft EIS states that all offshore oil and gas platforms in the Gulf of Mexico discharged roughly 15.3 billion gallons of produced water in 2014.[39] However, a review of records obtained from the Environmental Protection Agency pursuant to a request under the Freedom of Information Act reveals that offshore oil and gas platforms under the jurisdiction of Region 6—federal waters in the Western Planning Area and the Central Planning

[33] Colegrove KM, Venn-Watson S, Litz J, Kinsel MJ et al., *Fetal distress and in utero pneumonia in perinatal dolphins during the Northern Gulf of Mexico unusual mortality event*, Diseases of Aquatic Organisms 119, 1-16 (Apr. 12, 2016); Draft EIS at 4-24 (citing DeLeo et al., Response of deep-water corals to oil and chemical dispersant exposure, Deep-Sea Research II (2015)); Associated Press, *Officials Puzzled Over Drop in Kemp's Ridley Turtle Nests* (Aug. 12, 2013), http://www.kbtx.com/news/headlines/Officials-Puzzled-Over-Endangered-Turtle-Nest-Drop-219260881.html.

[34] Zachary Nixon, et al. Shoreline oiling from the Deepwater Horizon oil spill, Marine Pollution Bulletin (2016, in press).

[35] *See e.g.*, Oceana, Time For Action Six Years After Deepwater Horizon, Apr. 2016, http://usa.oceana.org/sites/default/files/deepwater_horizon_anniversary_report_updated_4-28.pdf.

[36] *Id.*

[37] *See e.g.*, Draft SEIS on Lease Sale 247 in the Central Gulf of Mexico at 4-8; 4-13; 4-17; 4-25.

[38] *Id.* at 4-7 to 4-8.

[39] Draft EIS at 3-63.

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Area off the coasts of Texas and Louisiana—discharged *more than 76 billion gallons* of produced waters in 2014.[40] This is a significant discrepancy that must be remedied, particularly considering that produced water contains toxic pollutants released during the drilling process. For example, produced water can contain harmful substances like benzene, arsenic, lead, hexavalent chromium, barium, chloride, sodium, sulfates, and boron, and it also can be radioactive.[41] Produced water itself is potentially harmful to humans, aquatic life, and ecosystems—in fact, a study sponsored by the U.S. Department of Energy demonstrated that oil production yields "environmentally hazardous" produced water.[42]

For all of these reasons, BOEM cannot properly define the environmental baseline, and BOEM cannot conduct a proper NEPA analysis unless and until these significant data gaps are filled. Yet BOEM is arbitrarily and capriciously proceeding to allow substantially more offshore oil and gas drilling regardless.

IV. BOEM Failed to Take a Hard Look at the Direct, Indirect, and Cumulative Impacts of Greenhouse Gas Emissions and Climate Change

Despite acknowledging that offshore oil and gas activities result in the emissions of greenhouse gases,[43] BOEM wholly failed consider the impacts of refining, transporting, and consuming the oil and gas that could be developed under its leasing proposal. Moreover, while BOEM incorporates some analysis of climate change, that analysis is entirely cursory and fails to adequately describe baseline conditions or even acknowledge how climate change will impact oil and gas infrastructure in the Gulf. Such failures violate NEPA.

A. <u>BOEM Failed to Consider Downstream Greenhouse Gas Emissions</u>

CBD, BL, GRN, LBB, RAHC-5

BOEM's Draft EIS fails to consider the greenhouse gas emissions that would be emitted by refining, transporting and burning the oil and gas to be extracted under its proposal. In evaluating the environmental impacts of the proposed action, NEPA requires BOEM to consider and describe the direct and indirect impacts.[44] These impacts are distinct from one another. Direct effects are "caused by the action and occur at the same time and place."[45] Indirect effects are caused by the action but, "are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effect on air and water and other natural systems, including ecosystems."[46] Downstream

[40] See Appendix A, attached.

[41] *See e.g.*, *Sierra Club, Lone Star Chapter v. Cedar Point Oil Co.*, 73 F.3d 546 (5th Cir. 1996); Mall, Amy, Petition for Rulemaking Pursuant to Section 6974(a) of the Resource Conservation and Recovery Act Concerning the Regulation of Wastes Associated with the Exploration, Development, or Production of Crude Oil or Natural Gas or Geothermal Energy at 8 (2010).

[42] C. Tsouris, Oak Ridge National Lab., Emerging Applications of Gas Hydrates at 7.

[43] *See e.g.*, Draft EIS at 3-91.

[44] 40 C.F.R. §§ 1502.16, 1508.7, 1508.8; *Northern Plains Resource Council v. Surface Transportation Board*, 668 F.3d 1067, 1072-73 (9th Cir. 2011).

[45] 40 C.F.R. § 1508.8(a).

[46] *Id.* § 1508.8(b).

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greenhouse gas emissions are precisely the kind of indirect effects that BOEM must consider in analyzing the impacts of its leasing proposal.

Indeed, guidance from the Council on Environmental Quality instructs agencies that "[e]missions from activities that have a reasonably close causal relationship to the federal action, such as those that may occur . . . as a consequence of the agency action (often referred to as downstream emissions) should be accounted for in the NEPA analysis."[47] As it described, "[f]or example, a particular NEPA analysis for a proposed open pit mine could include the reasonably foreseeable effects of various components of the mining process, such as . . . refining or processing the resource, and using the resource . . . as the direct and indirect effects of phases of a single proposed action."[48]

BOEM estimates that its proposal could result in the development and production of up to an estimated 9.5 billion barrels of oil equivalent.[49] It is possible even more oil will be developed given BOEM's estimates that put all undiscovered technically recoverable resources in the Gulf of Mexico at 73 billion barrels of oil equivalent.[50] Using EPA's carbon equivalent calculator, this means that BOEM's proposal could result in up to roughly 4.1 to 31.4 billion metric tons of greenhouse gas emissions from consumption of the oil.[51] But BOEM wholly failed to consider the impacts of these emissions or how allowing offshore oil and gas leases in federal waters will impact our ability to limit warming to 1.5 or 2°C consistent with the Paris Agreement.

Climate change, driven primarily by the combustion of fossil fuels, poses a severe and immediate threat to the health, welfare, ecosystems, and economy of the United States and the world. In recognition of these threats, the Paris Agreement—adopted by 197 countries, including the United States, on December 12, 2015—codifies the international, scientific consensus that climate change is an "*urgent and potentially irreversible threat to human societies and the planet* and thus requires the widest possible cooperation by all countries."[52] Accordingly, the Paris Agreement commits all signatories to an articulated target to hold the long-term global average temperature "to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels."[53] Immediate and aggressive greenhouse gas emissions reductions are necessary to keep warming below a 1.5° or 2°C rise above pre-industrial levels.

Put simply, there is only a finite amount of carbon dioxide ("CO_2") that can be released into the atmosphere without rendering the goal of meeting the 1.5°C (or even a 2°C) target

[47] Council on Environmental Quality, Revised Draft Guidance on Consideration of Greenhouse Gas Emissions and Climate Change in National Environmental Policy Act Evaluations (Dec. 2014) at 11.
[48] *Id.* at 12.
[49] Proposed Program at 5-10.
[50] BOEM, Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf, 2016, *available at* http://www.boem.gov/National-Assessment-2016/
[51] https://www.epa.gov/energy/ghg-equivalencies-calculator-calculations-and-references
[52] Paris Agreement, Decision, Art. 4(3); Recitals.
[53] *Id.*, Art. 2 (emphasis added).

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virtually impossible. Globally, proven fossil fuel reserves, let alone additional recoverable resources,[54] if extracted and burned, would release enough CO_2 to exceed this limit several times over.[55] Consequently, the vast majority of fossil fuels must remain in the ground.

The physical question of what amount of fossil fuels can be extracted and burned without negating a realistic chance of meeting a 1.5°C or even 2°C target is relatively easy to answer. The Fifth Assessment Report of the International Panel on Climate Change ("IPCC") and other expert assessments have established global carbon budgets, or the total amount of remaining carbon that can be burned while maintaining some probability of staying below a given temperature target. According to the IPCC, total cumulative anthropogenic emissions of CO_2 must remain below about 1,000 gigatons ("$GtCO_2$") from 2011 onward for a 66% probability of limiting warming to 2°C above pre-industrial levels.[56] The Paris Agreement aim of limiting the temperature increase to 1.5°C requires a more stringent carbon budget of only 400 $GtCO_2$ from 2011 onward (of which more than 100 $GtCO_2$ has already been emitted)[57] for a 66% probability of limiting warming to 1.5°C above pre-industrial levels.[58] Increasing the odds of meeting these targets requires meeting even stricter carbon budgets.[59] Given that global CO_2 emissions in 2014 alone totaled 36 $GtCO_2$,[60] humanity is rapidly consuming the remaining burnable carbon budget needed to have even a 66% chance of meeting the 1.5°C temperature limit.

Recent analysis shows that the potential emissions from all U.S. federal fossil fuel resources are between 349 and 492 $GtCO_2e$, with unleased fossil fuels comprising 91% of these potential emissions.[61] The OCS accounts for 64% of all unleased federal natural gas and 72% of all unleased federal oil, for an estimated total of between 52 and 62 $GtCO_2e$.[62] In other words, unleased federal fossil fuels, if extracted and burned, would consume between roughly 70 and 100% of a *global* budget of 450 $GtCO_2e$, the amount remaining at the start of 2016 under a

[54] *See* Whitney, Gene *et al.*, Cong. Research Serv., R40872, U.S. Fossil Fuel Resources: Terminology, Reporting and Summary 4-5 (2010).
[55] *See, e.g.*, IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change at 64 & Table 2.2 [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)] at 63-64 & Table 2.2. ("IPCC AR5 Synthesis Report").
[56] IPCC, 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, Summary for Policymakers at 27 ("IPCC AR5 Physical Science Basis"); *see also* IPCC AR5 Synthesis Report at 63-64 & Table 2.2. Higher probabilities of success require stricter carbon limits: to have an 80% probability of staying below the 2°C target, the budget from 2000 is 890 GtCO2, with less than 430 GtCO2 remaining. *See* Meinshausen, M. *et al.*, Greenhouse gas emission targets for limiting global warming to 2 degrees Celsius, 458 Nature 1158–1162 (2009) ("Meinshausen *et al.* 2009") at 1159; Carbon Tracker Initiative, Unburnable Carbon – Are the world's financial markets carrying a carbon bubble? available at http://www.carbontracker.org/wp-content/uploads/2014/09/Unburnable-Carbon-Full-rev2-1.pdf.
[57] From 2012-2014, 107 GtCO2 was emitted (*see* Annual Global Carbon Emissions at http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html). Given additional emissions in 2015, the remaining carbon budget for 1.5°C would now be well below 300 GtCO2 (approximately 450 Gt CO2e).
[58] IPCC AR5 Synthesis Report at 64 & Table 2.2.
[59] *See* Meinshausen *et al.* at 1159; Carbon Tracker Initiative 2013, Unburnable Carbon.
[60] *See* Global Carbon Emissions, http://co2now.org/Current-CO2/CO2-Now/global-carbon-emissions.html.
[61] *Id.* Using a metric of CO2e (which also includes the radiative or climate forcing potential of non-CO2 greenhouse gases such as methane), Mulvaney *et al.*'s study calculated that extraction and combustion of total U.S. fossil fuels would produce 697 to 1070 GtCO2e of emissions, with federal fossil fuels responsible for between 349 and 492 GtCO2e. The potential GHG emissions of unleased federal fossil fuel resources range from 319 to 450 492 GtCO2e.
[62] *Id.* at 18, 24-25 (offshore crude oil potential emissions of 27.65-31.50 GtCO2e, offshore natural gas potential emissions of 24.07-30.05 GtCO2e).

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budget scenario that itself has only a 66% chance of limiting temperature increase to 1.5°C.[63] Unleased OCS areas alone would consume between 11.6% and 13.8% of that *global* budget. Continued leasing of these fossil fuels is incompatible with any reasonable domestic and international path to limiting warming to 1.5°C or even 2°C.

Conversely, keeping fossil fuels in the ground by ending new offshore leases will help limit warming by reducing greenhouse gas emissions. For example, a recent report found that for each unit of oil that is not extracted from federal lands, net global consumption of oil and substitute fuels falls by 0.22 units by 2030, with a proportionate decrease in greenhouse gas emissions.[64] Accordingly, the report estimates that ending new offshore and onshore oil leases would lead to a net reduction of global CO_2 emissions from oil of 31 $MtCO_2$ in the year 2030.[65] Of this total, 85% (or 26 $MtCO_2$ in 2030) can be attributed to offshore oil leases covered by BOEM's Five-Year Program.[66] And the reduction in greenhouse gas emissions would increase in the years after 2030.[67]

Yet because BOEM ignores the impacts of consuming the oil and gas to be extracted under its proposal, BOEM wholly fails to discuss how its proposal can possibly be consistent with the Paris Agreement and efforts to limit warming to 1.5°C or even 2°C to avert the worst impacts of climate change. This failure violates NEPA.

B. <u>BOEM Failed to Adequately Consider Climate Change Impacts on the Ocean and Coastal Environment</u>

CBD, BL, GRN, LBB, RAHC-6

In addition to failing to address the impacts of consuming the oil and gas extracted under its proposal, BOEM failed to adequately describe baseline conditions related to climate change or consider the impacts of climate change on the ocean environment. While BOEM's analysis acknowledges that climate change is occurring and incorporates the analysis in the Draft EIS on BOEM's Five Year Program, its analysis is cursory and fails to properly disclose the enormity of the problem, or the contribution of its proposal to the problem. For example, BOEM fails to adequately analyze the impacts of ocean acidification over the course of its proposal and its proposal's contribution to these significant environmental problems. BOEM also failed to adequately consider increased storm severity and sea level rise.

Greenhouse gas pollution is causing the oceans to acidify at an alarming rate. The ocean's absorption of anthropogenic carbon dioxide is changing its chemistry, lowering its pH and causing ocean acidification.[68] Surface ocean pH has already dropped by about 0.1 pH units from 8.16 in 1800 to 8.05 today, resulting in a rise in surface ocean acidity of about 30 percent.[69]

[63] *Id.*
[64] Erickson, Peter and Michael Lazarus, *How would phasing out U.S. federal leases for fossil fuel extraction affect CO2 emissions and 2°C goals?* Stockholm Environment Institute, Working Paper, 2016-02 (2016) at 24.
[65] *Id.* at 25.
[66] *Id.* at 26.
[67] *Id.* at 32.
[68] Feely, R. A., S. C. Doney, and S. R. Cooley. 2009. Ocean acidification: present conditions and future changes in a high-CO_2 world. Oceanography 22:36-47.
[69] Orr, J. C., et al. 2005. Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms. Nature 437:681-686.

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CBD, BL, GRN, LBB, RAHC-6

The pH of the ocean is changing rapidly at a rate 100 times anything seen in hundreds of millennia, and may drop by another 0.3 or 0.4 (resulting in a 100–150% increase in acidity) by the end of this century.[70] If carbon dioxide emissions continue unabated, resulting changes in ocean acidity could exceed anything experienced in the past 300 million years.[71] Even if carbon dioxide emissions stopped immediately, the ocean would continue to absorb the excess carbon dioxide in the atmosphere, resulting in further acidification until the planet's carbon budget returned to equilibrium.

A primary impact of ocean acidification is that it depletes seawater of the carbonate compounds—aragonite and calcite—that many marine organisms need to build shells and skeletons.[72] As a result, ocean acidification hinders species such as corals, crabs, seastars, sea urchins, and plankton from building the protective armor they need to survive. Rising acidity also affects the basic functions of fish, squid, invertebrates, and other marine species, including detrimental effects on metabolism, respiration, and photosynthesis, which can thwart their growth and lead to higher mortality.[73] Because of its serious impacts to so many species, including those at the base of the food chain, ocean acidification threatens to disrupt the entire marine food web. Ocean acidification also decreases the sound absorption of seawater, causing sounds to travel further with potential impacts on whales and other marine mammals that may be sensitive to the noises created by vessel traffic, seismic surveys, military sonar, and other noise pollution.[74]

In addition, ocean acidification has the potential to profoundly affect the growth and toxicity of phytoplankton associated with harmful algal blooms ("HABs").[75] HABs can cause mortality in marine mammals through contamination of food sources. Some strains of phytoplankton in HABs produce copious amount of domoic acid, a kanic acid analog neurotoxin.[76] Exposure to this toxin via food sources can affect the brain, causing seizures, provoke organ failure, and ultimately death in several marine mammal species, from small sea

[70] Meehl, G. A., et al. 2007. 2007: Global Climate Projections. in S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, and G. H. Miller, editors. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge University Press, Cambridge, UK, and New York, NY, USA.
[71] Caldeira, K., and M. E. Wickett. 2003. Anthropogenic carbon and ocean pH. Nature 425:365.
[72] Fabry, V. J., B. A. Seibel, R. A. Feely, and J. C. Orr. 2008. Impacts of ocean acidification on marine fauna and ecosystem processes. ICES Journal of Marine Sciences 65:414-432.
[73] *Id.*
[74] Hester, K. C., E. T. Peltzer, W. J. Kirkwood, and P. G. Brewer. 2008. Unanticipated consequences of ocean acidification: A noisier ocean at lower pH. Geophysical Research Letters 35:L19601.
[75] Tatters, A. O., F.-X. Fu, and D. A. Hutchins. 2012. High CO2 and Silicate Limitation Synergistically Increase the Toxicity of Pseudo-nitzschia fraudulenta. PLoS ONE 7:e32116; Fu, F., A. Tatters, and D. Hutchins. 2012. Global change and the future of harmful algal blooms in the ocean. Marine Ecology Progress Series 470:207-233; Flynn, K. J., D. R. Clark, A. Mitra, H. Fabian, P. J. Hansen, P. M. Glibert, G. L. Wheeler, D. K. Stoecker, J. C. Blackford, and C. Brownlee. 2015. Ocean acidification with (de)eutrophication will alter future phytoplankton growth and succession. Proceedings of the Royal Society of London B: Biological Sciences 282:20142604.
[76] Anderson, D. M., et al. 2014. Understanding interannual, decadal level variability in paralytic shellfish poisoning toxicity in the Gulf of Maine: The HAB Index. Deep Sea Research Part II: Topical Studies in Oceanography 103:264–276.

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CBD, BL, GRN, LBB, RAHC-6

otters, seals, sea lions, to large whales.[77] In the past three decades, HABs seem to have become more frequent, more intense, and more widespread.[78]

BOEM also failed to consider how the increased frequency of hurricanes and other severe weather events and sea level rise will impact coastal areas and oil and gas infrastructure. As noted by the Environmental Protection Agency in finding that greenhouse gases endanger public health and welfare:

> Observed sea level rise is already increasing the risk of storm surge and flooding in some coastal areas. The conclusion in the assessment literature that there is the potential for hurricanes to become more intense (and even some evidence that Atlantic hurricanes have already become more intense) reinforces the judgment that coastal communities are now endangered by human induced climate change, and may face substantially greater risk in the future. Even if there is a low probability of raising the destructive power of hurricanes, this threat is enough to support a finding that coastal communities are endangered by greenhouse gas air pollution. In addition, coastal areas face other adverse impacts from sea level rise such as land loss due to inundation, erosion, wetland submergence, and habitat loss. The increased risk associated with these adverse impacts also endangers public welfare, with an increasing risk of greater adverse impacts in the future.[79]

In fact, from 1932 to 2010, coastal Louisiana has lost about 1.2 million acres, equating to coastal wetlands disappearing at a rate of about a football field per hour.[80] The oil and gas industry admits that it is responsible for at least 36% of the total loss of this area, though the Department of the Interior has stated that the industry could be responsible for as much as 56% of the loss.[81] And scientists say that at current rates, coastal erosion and sea level rise will lead to nearly all of Southeast Louisiana to be under water by 2100.[82] Yet BOEM fails to adequately analyze these impacts or how its proposal will contribute to these problems.

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[77] McHuron, E. A., D. J. Greig, K. M. Colegrove, M. Fleetwood, T. R. Spraker, F. M. D. Gulland, J. T. Harvey, K. A. Lefebvre, and E. R. Frame. 2013. Domoic acid exposure and associated clinical signs and histopathology in Pacific harbor seals (Phoca vitulina richardii). Harmful Algae 23:28–33; Kirkley, K. S., J. E. Madl, C. Duncan, F. M. Gulland, and R. B. Tjalkens. 2014. Domoic acid-induced seizures in California sea lions (Zalophus californianus) are associated with neuroinflammatory brain injury. Aquatic Toxicology 156:259–268; Jensen, S.-K., J.-P. Lacaze, G. Hermann, J. Kershaw, A. Brownlow, A. Turner, and A. Hall. 2015. Detection and effects of harmful algal toxins in Scottish harbour seals and potential links to population decline. Toxicon 97:1–14.

[78] Lewitus, A. J., et al. 2012. Harmful algal blooms along the North American west coast region: History, trends, causes, and impacts. Harmful Algae 19:133–159; Hallegraeff, G. M., editor. 2014. Impacts of climate change on harmful algal blooms and seafood safety. Assessment and management of seafood safety and quality: current practices and emerging issues. Rome.

[79] 74 Fed. Reg. at 66,498; *see also* EPA, Climate Impacts in the Southeast, https://www3.epa.gov/climatechange/impacts/southeast.html; Carter, L. M., J. W. Jones, L. Berry, V. Burkett, J. F. Murley, J. Obeysekera, P. J. Schramm, and D. Wear, 2014. *Ch. 17: Southeast and the Caribbean. Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 396-417. doi:10.7930/J0N-P22CB.

[80] Draft EIS at 3-188; Nathaniel Rich, The Most Ambitious Environmental Lawsuit Ever, NY Times, Oct. 02, 2014, http://www.nytimes.com/interactive/2014/10/02/magazine/mag-oil-lawsuit.html?_r=0.

[81] *Id.*

[82] Bob Marshall, The Lens, ProPublica, Aug. 28, 2014, http://www.scientificamerican.com/article/losing-ground-southeast-louisiana-is-disappearing-quickly/

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CBD, BL, GRN, LBB, RAHC-6

Moreover, while BOEM's analysis admits that hurricanes and other extreme weather events can damage pipelines and infrastructure resulting in a release of oil, BOEM's analysis fails to analyze how increased storm severity in the face of climate change will increase the risks of oil spills, accidents and other environmental harms associated with offshore oil and gas drilling in the Gulf of Mexico. The failure to do so violates NEPA.

V. BOEM Failed to Take a Hard Look at the Direct, Indirect and Cumulative Impacts of Oil Spills

BOEM's Draft EIS fails to take a hard look at the impacts of an oil spill by arbitrarily dismissing consideration of the impacts of a catastrophic oil spill, and by failing to adequately consider the dangers of transporting oil and gas. BOEM's failures violate NEPA.

A. <u>BOEM Must Analyze the Impacts of a Catastrophic Spill as Part of the Proposed Action</u>

CBD, BL, GRN, LBB, RAHC-7

Offshore oil and gas development consistently results in both chronic and disaster-related oil spills. For example, in 1979, an exploratory well in the Gulf of Mexico blew out and spilled 140 million gallons of oil over the course of 10 months. In 1989, the Exxon Valdese spilled more than 11 million gallons of oil into Alaska's Prince William Sound. In 2004, Hurricane Ivan hit the Gulf of Mexico off the coast of Louisiana toppling an offshore well platform owned by Taylor Energy, which has been leaking gallons upon gallons of oil every day for over a decade, and recent reports indicate a dramatic spike in the size of oil sheens and the volume of spilled oil since September, 2014.[83] In 2009, the Montara oil rig spilled between 29,600 and 222,000 barrels of oil into the Timor Sea over the span of ten weeks. In 2010, BP's *Deepwater Horizon* rig exploded, causing estimated 206 million gallons of oil to spill into the Gulf of Mexico over the course of almost three months.

These spills cause irreversible damage to marine and coastal environments, and the destructive impacts of large spills are immediate and severe. Oil spills and cleanup efforts are not just deadly to marine life, but also disruptive to ship traffic and detrimental to impacted shorelines, subsistence activities, commercial and recreational fishing, tourism, and the health of people living along the coast and people involved in clean-up efforts.

Nevertheless, BOEM largely dismisses the impacts of a catastrophic oil spill because oil and gas activities are regulated and changes have been implemented since Deepwater Horizon. But this self-serving assumption contradicts several federal studies published since the disaster finding that sufficient regulatory changes are still lacking. For example, a recent government report issued by the U.S. Chemical Safety and Hazard Investigation Board found that the causes of the Deepwater Horizon oil spill still have not been fully addressed, leading to the distinct risk

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[83] Zoe Schlanger, Newsweek, *Oil Spill You've Never Heard of Has Been Leaking into Gulf of Mexico For a Decade* (Apr. 18, 2015), http://www.newsweek.com/oil-spill-youve-never-heard-has-been-leaking-gulf-decade-20-times-larger-323373.

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CBD, BL, GRN, LBB, RAHC-7

that another catastrophic spill will occur, especially in the context of deepwater drilling.[84] This is particularly alarming considering that BOEM's Five-Year Program suggests that oil and gas activity in the Gulf of Mexico will be focused on drilling increasingly deepwater wells: "the greatest undiscovered resource potential in the U.S. OCS is forecast to exist in the deep and ultra-deep waters of the [Gulf of Mexico]."[85] In other words, oil companies will be drilling increasingly deeper wells—wells even deeper than that which led to the Deepwater Horizon spill—thereby increasing the risk of a catastrophic oil spill.

Another recent report from the U.S. Government Accountability Office found that BSEE, BOEM's sister agency, "has not fully addressed deficiencies in its investigative, environmental compliance, and enforcement capabilities identified by investigations after the Deepwater Horizon incident."[86] It concludes that "BSEE continues to face deficiencies in each of these capabilities that undermine its ability to effectively oversee offshore oil and gas development."[87] In a nutshell, another Deepwater Horizon catastrophe is not a question of if, but a question of when. BOEM must therefore analyze the impacts of a catastrophic oil spill as part of the proposed action.

B. <u>BOEM Failed to Adequately Consider the Risks of an Oil Spill</u>

CBD, BL, GRN, LBB, RAHC-8

BOEM also dismisses the import of routine and large oil spills because the transport of oil and gas is federally regulated. However, transporting oil and gas is inherently dangerous and spills occur as a matter of course in offshore oil and gas operations from both tankers and pipelines. BOEM must give consideration of impacts from such spills proper weight.

BOEM's Draft EIS states that the vast majority of oil and gas extracted in the Gulf of Mexico is transported via pipeline.[88] A review of records of the federal Pipeline and Hazardous Materials Safety Administration, which maintains a database of all U.S. pipelines, demonstrates that transport of oil and gas carries a significant risk of environmental and public safety impacts. Nationally, there were nearly 8,000 significant incidents with U.S. pipelines, involving death, injury, and economic and environmental damage between 1986 and 2013—more than 300 per year.[89] Incidents classified as "significant" are those resulting in death or injury, had damages more than $50,000, spilled more than five barrels of highly volatile substances or 50 barrels of other liquid, or where the liquid exploded or burned.[90] And offshore spills occur as a matter of course in the Gulf of Mexico. For example, in 2015, an offshore natural gas pipeline in Gulf of Mexico ruptured, causing a fire that injured two workers.[91] And in 2016, nearly 90,000 gallons

[84] Clifford Krauss, *Fixes After BP Spill Not Enough, Board Says*, New York Times at B2 (June 6, 2014), http://www.nytimes.com/2014/06/06/business/energy-environment/fixes-after-bp-spill-not-enough-board-says.html?_r=0.
[85] BOEM, 2017-2022 Outer Continental Shelf Draft Proposed Program at 3-6.
[86] U.S. GAO, Report: Interior's Bureau of Safety and Environmental Enforcement Restructuring Has Not Addressed Long-Standing Oversight Deficiencies (Feb. 2016), *available at* http://www.gao.gov/assets/680/675099.pdf.
[87] *Id.* at 28.
[88] Draft EIS at 3-38 to 3-39.
[89] The Center, *America's Dangerous Pipelines*, http://www.biologicaldiversity.org/campaigns/americas_dangerous_pipelines/.
[90] *Id.*
[91] AP, 2 crew members injured after pipline ruptures in Gulf, Aug. 27, 2015, http://fuelfix.com/blog/2015/08/27/2-crew-members-injured-after-pipeline-ruptures-in-gulf/#34117101=0.

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CBD, BL, GRN, LBB, RAHC-8

of oil leaked from a flow line that created an oil sheen in the Gulf of Mexico that was two by 13 miles wide.[92]

In fact, the U.S. Department of Transportation found that offshore pipelines can be more vulnerable than onshore pipelines. They have a greater vulnerability to severe weather conditions than onshore pipelines, especially during hurricane events. And massive wave action can alter the pipeline stability, causing gradual displacement, especially in small diameter pipelines.[93] Offshore pipelines can also face more corrosion than onshore pipelines due to higher temperature and pressure conditions that occur during the laying of these pipelines.[94]

In addition, aging poses risks of corrosion, erosion and fatigue stress to subsea pipelines.[95] Subsea pipeline corrosion appears to accelerate over time,[96] and can act synergistically with fatigue stress to increase the rate of crack propagation.[97] Marine environments are especially known to produce significant corrosion on steel surfaces, and when a steel structure is at or beyond its elastic limit, the rate of corrosion increases 10-15%.[98] One offshore pipeline study found that after 20 years the annual probability of pipeline failure increases rapidly, with values in the range of 0.1 to 1.0, which equates to a probability of failure of 10% to 100% per year.[99] Another study covering 1996-2010 found that accident incident rates, including spills, increased significantly with the age of infrastructure.[100]

Consistent with these findings, a report published in 2010 found that the number of oil spills from offshore rigs and pipelines between 2000 and 2009 *more than quadrupled* the rate of spills in prior decades.[101] In particular, from the early 1970s through the 1990s, offshore rigs and pipelines averaged about four spills per year of at least 2,100 gallons. The average annual total skyrocketed to more than 17 from 2000 to 2009, and averaged 22 per year from 2005 to 2009

[92] *See e.g.*, Terry Wade, Reuters, Shell Shuts Wells Near Oil Spill off Louisiana, May 12, 2016, http://www.scientificamerican.com/article/shell-shuts-wells-near-oil-spill-off-louisiana.
[93] U.S. Department of Transportation: Federal Highway Administration. Impacts of Climate Change and Variability on Transportation Systems and Infrastructure: The Gulf Coast Study, Phase 2. 2015.
[94] Keuter, J. (2014). In-line Inspection of Pipes Using Corrosion Resistant Alloys (CRA). Rosen Technology and Research Center GmbH, Rosen Group, Germany; Standard Oil Company (1981) Drilling fluid bypass for marine riser. U.S. Grant. US4291772 A.
[95] Petroleum Safety Authority Norway. 2006. Material Risk – Ageing offshore installations. Prepared by Det Norske Veritas on request from Petroleum Safety Authority Norway, www.psa.no/report-archive/category1033.html.
[96] Mohd, M.H. and J.K. Paik. 2013. Investigation of the corrosion progress characteristics offshore oil well tubes. Corrosion Science 67:130-141.
[97] PSA Norway 2006.
[98] Mohd, M.H. and J.K. Paik (2013) Investigation of the corrosion progress characteristics of offshore subsea oil well tubes. Corrosion Science 67: 130-141; A. Igor, R.E. Melchers, Pitting corrosion in pipeline steel weld zones, Corros. Sci. 53 (12) (2011) 4026–4032; R.E. Melchers, M. Ahammed, R. Jeffrey, G. Simundic, Statistical characterization of surfaces of corroded steel plates, Mar. Struct. 23 (2010) 274–287.
[99] Bea, R., C. Smith, B. Smith, J. Rosenmoeller, T. Beuker, and B. Brown. 2002. Real-time Reliability Assessment & Management of Marine Pipelines. 21st International Conference on Offshore Mechanics & Arctic Engineering. ASME.
[100] Muehlenbachs, et al. 2013. The impact of water depth on safety and environmental performance in offshore oil and gas production. Energy Policy 55:699-705.
[101] Alan Levin, Oil Spills Escalated in this Decade, USA Today, June 8, 2010, available at http://usatoday30.usatoday.com/news/nation/2010-06-07-oil-spill-mess_N.htm.

CBD, BL, GRN, LBB, RAHC-8

alone.[102] And the number of spills, as well as the quantity of spilled oil, grew significantly worse even when taking increased production in account.[103]

Federal data show that new pipelines also carry a high risk of spills, mostly because of faulty design or construction.[104] These data indicate there are more oil spills in the first two years of pipeline's life than in the next seven years combined.[105] This is a significant concern given that BOEM estimates a single lease sale could result in the installation of up to 1,330 miles of new offshore pipelines.[106] BOEM must therefore conduct a more thorough analysis of the risks and effects of oil spills in the Gulf of Mexico.

VI. BOEM Failed to Take a Hard Look at the Direct, Indirect and Cumulative Impacts from Offshore Fracking and Acidizing

CBD, BL, GRN, LBB, RAHC-9

BOEM acknowledges that oil companies use offshore fracking and other well stimulation treatments in the Gulf of Mexico.[107] Offshore fracking and acidizing cause environmental damages beyond those of conventional offshore oil and gas development by producing water and air pollution, increasing the risk of earthquakes and oil spills, and prolonging the life of aging infrastructure and our use of dirty fossil fuels. But BOEM either wholly fails to address the impacts that could occur from these dangerous practices in its Draft EIS, or provides a woefully inadequate analysis.

Water contamination is a significant risk of fracking because of the hundreds of chemicals used in fracking fluid. For example, a peer-reviewed study that examined fracking fluid products determined that more than 75% of the chemicals could affect the skin, eyes, and other sensory organs, and the respiratory and gastrointestinal systems; approximately 40 to 50% could affect the brain/nervous system, immune system, cardiovascular system, and the kidneys; 37% could affect the endocrine system; and 25% could cause cancer and mutations.[108] In addition to posing a significant health and safety risk to humans, fracking chemicals can kill or harm a wide variety of marine life. Scientific research has indicated that 40% of the chemicals used in fracking can harm aquatic animals and other wildlife.[109]

Another recent study found that oil companies use dozens of extremely hazardous chemicals to acidize wells. Specifically, the study found that almost 200 different chemicals have

[102] *Id.*
[103] *Id.*
[104] Richard Stover, PhD, *Review of the US Department of Transportation Report The State of the National Pipeline Infrastructure* Aug. 2013, *available at* http://www.icogitate.com/~oildrop/PHMSA_report_analysis.pdf
[105] *Id.*
[106] Draft EIS at 3-42.
[107] *See e.g.*, Draft SEIS on Lease Sale 247 at 3-9.
[108] Colborn, Theo, et al. 2011. Natural Gas Operations for a Public Health Perspective. 17 Human and Ecological Risk Assessment 1039; Elliot, E.G. et al. 2016. A systematic evaluation of chemicals in hydraulic -fracturing fluids and wastewater for reproductive and developmental toxicity. Journal of Exposure Science and Environmental Epidemiology 1-10.
[109] CCST. 2014. Advanced Well Stimulation Technologies in California: An Independent Review of Scientific and Technical Information. August 28, 2014; Christopher D. Kassotis, et al. 2015. Endocrine-Disrupting Activity of Hydraulic Fracturing Chemicals and Adverse Health Outcomes After Prenatal Exposure in Male Mice. Endocrinology. 156(12):4458-73. DOI: 10.1210/en.2015-1375.

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CBD, BL, GRN, LBB, RAHC-9

been used and that at least 28 of these substances are F-graded hazardous chemicals—carcinogens, mutagens, reproductive toxins, developmental toxins, endocrine disruptors or high acute toxicity chemicals.[110] Hydrofluoric acid, for example, is acutely toxic, and exposure to fumes or very short-term contact with its liquid form can cause severe burns. The study notes that acidizing chemicals can make up as much as 18 percent of the fluid used in these procedures.[111] Further, each acidization can use as much as hundreds of thousands of pounds of some chemicals.[112]

This raises serious concerns as many of the hundreds of active offshore platforms in the Gulf discharge all or a portion of their produced water, including chemicals used in fracking and acidizing, into the ocean. While BOEM does not analyze the impacts of fracking wastewater discharges, it dismisses the import of produced water discharges generally because the discharge is regulated by Clean Water Act permits issued by EPA. But, as explained above, BOEM grossly underestimates the amount of produced water being discharged. Moreover, BOEM ignores the fact that the permit contains no real limit on the quantity of fracking or acidizing chemicals that can be discharged. Moreover, an agency cannot excuse itself from its NEPA hard look duty because a "facility operates pursuant to a. . . permit" or because the impacts have been discussed in a non-NEPA document.[113]

When not dumped directly into the ocean, wastewater from well stimulation is injected into the seafloor or transported onshore and injected there. This disposal method can result in leaks and contamination through the loss of well casing integrity. Studies have shown that 30% of offshore oil wells in the Gulf of Mexico experienced well casing damage in the first five years after drilling, and damage increased over time to 50% after 20 years.[114] Well stimulation can increase the risk of well casing damage.[115] For example, a recent scientific study found that older wells can become pathways for fluid migration, and that the high injection pressures used in fracking can "increase this risk significantly."[116] For this same reason, fracking can also increase the risk of oil spills. This disposal method can also result in the contamination of drinking water.[117] But BOEM ignores these impacts.

[110] Khadeeja Abdullah, Timothy Malloy, Michael K. Stenstrom & I. H. (Mel) Suffet. 2016. Toxicity of acidization fluids used in California oil exploration, Toxicological & Environmental Chemistry.
[111] *Id.*
[112] *Id.*
[113] *S. Fork Band of W. Shoshone v. U.S. Dep't of Interior*, 588 F.3d 718, 726 (9th Cir. 2009).
[114] Vengosh, A. et al. 2014. A critical review of the risks to water resources from unconventional shale gas development and hydraulic fracturing in the United States. Environmental Science & Technology 48:8334-8348; Davies, R.J. et al. 2014. Oil and gas wells and their integrity: Implications for shale and unconventional resource exploitation. Marine and Petroleum Geology 56:239-254.
[115] Davies, et al. 2014; U.S. EPA. Assessment of the Potential Impacts of Hydraulic Fracturing for Oil and Gas on Drinking Water Resources, External Review Draft (June 2015) at 6-11.
[116] California Council on Science and Technology. 2015. An Independent Scientific Assessment of Well Stimulation in California, Volume II: Potential Environmental Impacts of Hydraulic Fracturing and Acid Stimulations, 20 July, at 39 ("CCST").
[117] Dominic C. DiGiulio and Robert B. Jackson. 2016. Impact to Underground Sources of Drinking Water and Domestic Wells from Production Well Stimulation and Completion Practices in the Pavillion, Wyoming, Field. Environmental Science and Technology. DOI: 10.1021/acs.est.5b04970.

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CBD, BL, GRN, LBB, RAHC-9

In addition, new studies have drawn a strong connection between the recent rise in fracking wastewater injection and increased earthquake rates.[118] For example, the USGS has recognized that wastewater disposal from fracking is a "contributing factor" to the six-fold increase in the number of earthquakes in Oklahoma.[119] Another recent study also found that wastewater injection is responsible for the dramatic rise in the number of earthquakes in Colorado and New Mexico since 2001.[120] Wastewater injection has been scientifically linked to earthquakes of magnitude three and greater in at least six states: Arkansas,[121] Colorado,[122] Ohio,[123] Oklahoma,[124] Texas,[125] and New Mexico.[126] And a recent study attributed wastewater injection from fracking operations to earthquakes in California.[127]

But it is not just wastewater injection that can lead to earthquakes. The practice of fracking itself has been found to contribute directly to seismic events.[128] Even if the earthquakes that fracking directly generates are small, fracking could be contributing to increased stress in faults that leaves those faults more susceptible to otherwise naturally triggered earthquakes of a greater magnitude.[129] BOEM's Draft EIS ignores these impacts as well. The failure to take a hard look at the impacts of offshore fracking and acidizing violates NEPA.

VII. BOEM Failed to Adequately Consider Cumulative Impacts

CBD, BL, GRN, LBB, RAHC-10

In evaluating the environmental impacts of the proposed action, NEPA requires BOEM to consider and describe the direct, indirect, and cumulative impacts.[130] Cumulative impacts are those impacts that "result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from

[118] Van de Elst, Nicholas J. et al. 2013. Enhanced Remote Earthquake Triggering at Fluid-Injection Sites in the Midwestern United States, 341 *Science* 164.
[119] Sumy, D. F., *et al*, 2014. Observations of static Coulomb stress triggering of the November 2011 *M*5.7 Oklahoma earthquake sequence, *J. Geophys. Res. Solid Earth*, 119, 1904–1923, DOI:10.1002/2013JB010612; USGS, *Record Number of Oklahoma Tremors Raises Possibility of Damaging Earthquakes*, May 2, 2014, http://www.usgs.gov/newsroom/article.asp?ID=3880.
[120] Justin L. Rubinstein, et al. 2014. The 2001 – Present Induced Earthquake Sequence in the Raton Basin of Northern New Mexico and Southern Colorado, *Bulletin of the Seismological Society of America*, 2014 DOI: 10.1785/0120140009.
[121] E&E News, USGS, Okla. warn of more drilling-related earthquakes in State, Mike Soraghan. Oct. 25, 2013.
[122] *Id.*
[123] Ohio Dept. of Nat. Resources (2012) *Executive Summary: Preliminary Report on the Northstar 1 Class II Injection Well and the Seismic Events in the Youngstown, Ohio Area*, Fountain, Henry, Disposal halted at well after new quake in Ohio. *New York Times*, Jan. 1, 2012.
[124] Holland, Austin, Examination of possibly induced seismicity from hydraulic fracturing in the Eola Field, Garvin County, Oklahoma, Oklahoma Geological Survey Open-File Report OF1-2011 (2011).
[125] Frohlich, Cliff (2012) Two-year survey comparing earthquake activity and injection-well locations in the Barnett Shale, Texas, *Proceedings of the National Academy of Sciences*. Vol 109, No. 35.
[126] Rubinstein, J. L. et al. 2012.
[127] T. H. W. Goebel, et al. 2016. Wastewater disposal and earthquake swarm activity at the southern end of the Central Valley, California, Geophysical Research Letters. Vol. 43, Issue 3. Pages 1092-1099.
[128] Van der Elst, 2013, BC Oil & Gas Commission, Industry Bulletin. 2015-32, Dec 15, 2015, https://www.bcogc.ca/node/12951/download.
[129] Van der Elst, et al. 2013.
[130] 40 C.F.R §§ 1502.16, 1508.7, 1508.8; *Northern Plains Resource Council v. Surface Transportation Board*, 668 F.3d 1067, 1072-73 (9th Cir. 2011).

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individually minor but collectively significant actions taking place over a period of time."[131] BOEM's Draft EIS fails to adequately consider the indirect and cumulative impacts of its proposal to adopt the preferred alternative and auction off yet more of the Gulf of Mexico to oil companies.

Specifically, BOEM wholly fails to actually analyze the impacts of the proposed action in light of other activities affecting the Gulf of Mexico because non-OCS activities generate more impacts, such as more air emissions than OCS activities.[132] But NEPA requires agencies to consider *all* the significant impacts of their actions; it does not excuse consideration of one impact simply because another impact may be more significant.

Moreover, BOEM often concludes that the cumulative impacts from its proposal will not be significant because it is not significant compared to all the other impacts that affect the Gulf of Mexico.[133] But, as its name suggests, when conducting a cumulative impacts analysis, BOEM must *add* the impacts of its proposal to all other past, present and reasonably foreseeable future impacts, not just compare the impacts.[134] BOEM's failure to conduct a proper cumulative impacts analysis renders its Draft EIS fatally flawed.

VIII. BOEM Failed to Consider an Adequate Range of Reasonable Alternatives and Failed to Properly Consider the No-Action Alternative

NEPA requires a "detailed statement" of "alternatives to the proposed action."[135] The purpose of this section is "to insist that no major federal project should be undertaken without intense consideration of other more ecologically sound courses of action, including shelving the entire project, or of accomplishing the same result by entirely different means."[136] In this way, the analysis of alternatives is the "heart of the environmental impact statement."[137] But BOEM's Draft EIS wholly fails to analyze a reasonable range of alternatives, and fails to properly consider the no-action alternative.

A. BOEM's Draft EIS Fails to Analyze a Reasonable Range of Alternatives

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In the alternatives analysis, an agency must "provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact."[138] The analysis must "rigorously explore and objectively evaluate all reasonable alternatives."[139] While an agency is not obliged to consider every alternative to every aspect of a proposed action, the agency must "consider such alternatives to the proposed action as may partially or completely meet the proposals goal."[140]

[131] 40 C.F.R. § 1508.7.
[132] Draft SEIS at 4-10.
[133] *See e.g. id.* at 4-92, 4-135.
[134] 40 C.F.R. § 1508.7.
[135] 42 U.S.C. § 4332(2)(c).
[136] *Environmental Defense Fund v. Corps of Engineers*, 492 F.2d 1123, 1135 (5th Cir. 1974).
[137] 40 C.F.R. § 1502.14.
[138] *Id.* § 1508.9.
[139] *Id.* § 1502.14.
[140] *Nat. Resources Defense Council, Inc. v. Callaway*, 524 F.2d 79, 93 (2d Cir. 1975).

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In its Draft EIS, BOEM considered five alternatives: (A) region-wide lease sales in the Gulf of Mexico (the proposed alternative); (B) region-wide lease sales excluding available unleased blocks in the Western Planning Areas; (C) region-wide lease sales excluding available unleased blocks in the Central and Eastern Planning Areas; (D) Alternatives A, B, or C with the option to exclude unleased blocks subject to the topographic features, live bottom and/or blocks south of Baldwin County, AL lease stipulations; and (E) no new lease sales (the purported no-action alternative).[141] Even if BOEM properly limited its purpose and need statement (which it did not), BOEM unreasonably ruled out alternatives that would restrict oil and gas development, even if they would have met the "need" of holding lease sales to further the development of OCS oil and gas resources. As such, BOEM failed to "rigorously explore" and "objectively evaluate" all reasonable alternatives.

For example, BOEM failed to examine an alternative that would prohibit new oil and gas leases in designated critical habitat for the Northwest Atlantic loggerhead sea turtle distinct population segment.[142] This habitat is essential for the survival and recovery of these imperiled sea turtles given its importance for several live-stages including development, foraging, and cover.[143] BOEM must consider such an alternative, particularly in light of its acknowledgement that the cumulative impacts of ongoing offshore oil and gas activities on the OCS is expected to result in a number of chronic and sublethal effects on sea turtles that could have population-level impacts.[144]

BOEM also failed to consider an alternative that would prohibit new oil and gas leases in the Mississippi Canyon to protect sperm whales because biological data does not support such an exclusion. However, as BOEM is well aware, the Mississippi Canyon is the site of the Deepwater Horizon catastrophe. Accordingly, the Mississippi Canyon suffered significant exposure to oil and toxic dispersants. Given the persistence of oil in the marine environment, the Canyon may be contaminated for decades.[145] A study of sperm whales in the Canyon following the spill found nickel and chromium—two genotoxic metals found in Macondo oil—that were two to five times higher than the global mean for the species.[146] And, as explained above, other wildlife is still suffering the impacts of the oil spill and cleanup efforts, such as corals, jellyfish, and sea turtles. A ban on new leasing in Mississippi Canyon would help protect these species from further disruption caused by new offshore oil and gas activities. BOEM's cursory dismissal of this alternative from further consideration was improper.

BOEM also failed to consider excluding the De Soto Canyon from availability for leasing. The De Soto Canyon is important habitat for a variety of species, including Bryde's whales, sperm whale and other cetaceans. Virtually all reported sightings of Bryde's whales have

[141] Draft EIS at Ix to xiii.
[142] 79 Fed. Reg. 39,855 (July 10, 2014).
[143] *Id.* at 39,881.
[144] Draft EIS at 4-286.
[145] E.B. Kujawinski, et al., Fate of dispersants associated with the Deepwater Horizon oil spill, 45 Environmental Science & Technology 1298-1306 (2011).
[146] J.P. Wise, Jr., et al., Concentrations of the genotoxic metals, chromium and nickel, in whales, tar balls, oil slicks, and released oil from the Gulf of Mexico in the immediate aftermath of the Deepwater Horizon oil crisis: Is genotoxic metal exposure part of the Deepwater Horizon legacy? 48 Environmental Science and Technology 2997-3006 (2014).

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occurred within the De Soto Canyon, suggesting a highly restricted range.[147] A recent study by the National Marine Fisheries Service suggests that the population is isolated and evolutionarily distinct from all other Bryde's whales examined to date, indicating that the species may be a distinct subspecies.[148] Recent abundance estimates put the population's size at fewer than 40 animals, meaning it is highly vulnerable to impacts from oil and gas activities.[149] Accordingly, BOEM should consider excluding this area from its proposal.

In addition, BOEM failed to examine an alternative that would prohibit drilling activities in and around areas where ESA-listed corals are found in the Gulf of Mexico.[150] This is despite BOEM's express acknowledgment that corals are particularly vulnerable to disturbance and that "due to their relatively low population sizes, any impacts form accidental events on ESA-listed corals would have a magnified effect on each of those species."[151] BOEM also arbitrarily dismissed expanding the exclusion zone for the Flower Garden Banks National Marine Sanctuary.[152] BOEM stated it did not further consider expanding the exclusion area because the proposed expansion is still in the early planning stages.[153] But BOEM has independent authority to restrict the areas where offshore oil and gas activities occur under OCSLA.[154] And the fact that the National Marine Fisheries Service is even considering expanding the Sanctuary indicates that the area contains important and biologically diverse marine life, including species that are particularly vulnerable to oil and gas activities and spills such as corals. BOEM should therefore consider such an alternative. As described above, oil spills occur as a matter of course in the Gulf of Mexico; lease stipulations related to avoiding bottom disturbance cannot change this reality.

BOEM also failed to examine alternatives that would otherwise limit development and production activities, such as an alternative that would limit the number of wells that could be drilled under its proposal or an alternative that would prohibit the use of particularly dangerous drilling activities such as offshore fracking and acidizing.

BOEM also failed to consider an alternative that would end all new offshore oil and gas leasing pending a plan to limit warming to 1.5° or 2°C. BOEM's failure to consider such an alternative is particularly troubling considering recent reports finding that ending new offshore leases will lead to reductions in global greenhouse gas emissions[155] and that BOEM has already leased over 22 million acres of the Gulf of Mexico to oil companies. Many of the leases in the Gulf of Mexico are relatively new leases, meaning that, by BOEM's own admission, activities under these leases will last up to 70 years. BOEM's analysis wholly fails to consider why the OCS areas already under lease—many of which are inactive—are not sufficient to supply the nation's energy needs while we transition away from dirty fossil fuels and toward clean

[147] NRDC, *Petition to list the Gulf of Mexico Bryde's whale* (Balaenoptera edeni) *as endangered under the Endangered Species Act*, Sept. 2014, *available at* http://docs.nrdc.org/wildlife/files/wil_14091701a.pdf.
[148] *Id.*
[149] *See* e.g., Draft EIS at 4-229, 245.
[150] *See* e.g., Draft EIS at 4-168 (noting ESA-listed coral species are found in the WPA and CPA of the Gulf).
[151] *Id.* at 4-168 to 4-169.
[152] *Id.* at 2-16.
[153] *Id.*
[154] *See* e.g., 43 U.S.C. §§ 1337(a)(1), 1802(2).
[155] Stockholm Environment Institute, *supra* n. 64.

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energy.[156] BOEM must consider this, along with the need and national policy to transition to clean energy sources and development of renewable energy from the OCS.

Finally, BOEM failed to consider an alternative that would institute a regional citizens' advisory council in the Gulf of Mexico. The Commission recommended the formation of such an advisory group in the Gulf of Mexico, and that it represent the broad community interests in the areas, including the fishing and tourism industry, and be funded by oil and gas lease holders.[157] The council of stakeholders would provide ongoing, independent research and recommendations for environmental safeguards of offshore drilling and transportation.

B. <u>BOEM Failed to Adequately Consider the No-Action Alternative</u>

CBD, BL, GRN, LBB, RAHC-12

Moreover, BOEM's analysis of Alternative E – the "no-action" alternative – is inadequate. BOEM repeatedly states that the no action alternative means that the lease would not occur under the Five-Year Program for 2017-2022, but could occur in a future five-year program.[158] Thus, according to BOEM, the no-action alternative encompasses the same potential impacts as a decision to delay the lease sale to a later time. But this approach "avoid[s] the task actually facing [BOEM]. In assuming that, no matter what, the proposed activities would surely occur, [BOEM is] neglecting to consider what would be a true 'no action' alternative."[159]

In addition, in considering the cumulative impacts of Alternative E, BOEM simply states that the impacts of adopting this alternative will "depend on the extent to which the public were to interpret it as a signal of a policy change that would continue into future lease sales."[160] This cursory statement wholly fails to satisfy the agency's duty to rigorously explore and objectively evaluate the no-action alternative. Further, it ignores the fact that the United States has committed, along with more than 190 other countries, to avoid the worst effects of climate change by limiting warming to 2 °C or less, and that science tells us that we must limit the supply of fossil fuels if we are to meet this commitment. This clearly necessitates a change in policy, since under a business-as-usual approach, the world would warm to over 5 °C by the end of the century.[161]

IX. BOEM Failed to Adequately Consider Environmental Justice Issues and Failed to Quantify the Social and Environmental Costs of its Proposal

CBD, BL, GRN, LBB, RAHC-13

BOEM's proposal raises significant environmental justice issues. But BOEM's Draft EIS

[156] U.S. Department of the Interior, "Oil and Gas Utilization, Onshore and Offshore: Updated Report to the President" (May 2012), *available at* https://www.doi.gov/sites/doi.gov/files/migrated/news/pressreleases/upload/Final-Report.pdf
[157] Commission Report, *supra* n.8 at 268-269.
[158] *See* e.g., Draft EIS at 4-122 (noting that impacts to deepwater benthic communities would merely be delayed under the no action alternative); 4-184 (noting same regarding live bottom communities); 4-312 (noting same regarding corals).
[159] *Conservation Council of Hawaii v. NMFS*, 97 F. Supp. 3d 1210, 1236 (D. Haw. 2015).
[160] Draft EIS at 4-418.
[161] *See* Oil Change International, *The EIA's oil forecast is a climate disaster, why does Obama use it to justify drilling?* at 4 (Aug. 27, 2015), *available at* http://priceofoil.org/2015/08/27/the-eias-oil-forecast-is-a-climate-disaster-why-does-obama-use-it-to-justify-drilling/ (describing the warming effect of emissions from EIA's business-as-usual scenario compared to other scenarios that assume carbon reductions to meet climate goals).

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fails to adequately address these significant impacts, or adequately analyze the social and environmental costs of its proposal.

As BOEM is well aware, on February 11, 1994, President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations." The Executive Order makes it the responsibility of each Federal agency to "make achieving environmental justice part of its mission in identify and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Accompanying this order was a Presidential Memorandum stating that "each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by [NEPA]." The CEQ has also issued guidance on incorporating environmental justice considerations in the NEPA process.[162] The guidance states in part:

> Early and meaningful public participation in the federal agency decision making process is a paramount goal of NEPA. CEQ's regulations require agencies to make diligent efforts to involve the public throughout the NEPA process. Participation of low-income populations, minority populations, or tribal populations may require adaptive or innovative approaches to overcome linguistic, institutional, cultural, economic, historical, or other potential barriers to effective participation in the decision-making processes of Federal agencies under customary NEPA procedures.[163]

States bordering the Gulf of Mexico are home to a variety of onshore oil and gas infrastructure that support offshore oil and gas drilling activities, including oil refineries. Toxic pollution from these refineries and petrochemical facilities disproportionately impact low-income neighborhoods and communities of color. For example, Port Arthur, Texas is home to two facilities that refine more than 900,000 barrels of crude per day.[164] The Environmental Protection Agency's Toxics Release Inventory places Jefferson County, where Port Arthur is located, among the worst in the nation for emissions of chemicals known to cause cancer, birth defects, and reproductive disorders. Data collected by the Texas Cancer Registry indicates that cancer rates among African Americans in Jefferson County are roughly 15% higher than they are for the average Texan, and the mortality rate from cancer is more than 40% higher.[165]

[162] CEQ, Environmental Justice: Guidance Under the National Environmental Policy Act, http://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-EJGuidance.pdf.
[163] *Id.* at 13.
[164] *See* e.g., NRDC, Port Arthur, Texas: American Sacrifice Zone, Aug. 26, 2013, http://archive.onearth.org/articles/2013/08/if-built-the-keystone-xl-pipeline-will-end-in-one-toxic-town.
[165] *See also*, O'Rourke, et al., JUST OIL? THE DISTRIBUTION OF ENVIRONMENTAL AND SOCIAL IMPACTS OF OIL PRODUCTION AND CONSUMPTION, Annu. Rev. . Resour. 2003. 28:587–617, doi: 10.1146/annurev.energy.28.050302.105617; Environmental Integrity Project, Breakdowns in Air Quality, Apr. 27, 2016, Earthjusitce, Community Impact Report: The Toll of Refineries on Fenceline Communities, Oct. 2014; Southwest Workers Union, The Oil Industry in the Gulf of Mexico: A history of Environmental injustices, Aug. 2003; Environmental Integrity Project, ACCIDENT PRONE: Malfunctions and "Abnormal" Emission Events at Refineries, Chemical Plants, and Natural Gas Facilities in Texas, 2009-2011, July 18, 2012.

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Moreover, many of these communities are also on the frontlines of climate change, with severe storms like Hurricane Katrina displacing people. And, as explained above, coastal areas in Louisiana are eroding at the rate of a football field an hour, meaning the area is losing important buffers to the impacts of hurricanes, meaning that the impacts of such storms on frontline communities are only going to intensify in the future. Additionally, scientists say that at current rates, coastal erosion and sea level rise will lead to nearly all of Southeast Louisiana being under water by 2100, leading to the displacement of even more communities.

BOEM's proposal will exacerbate all these impacts by leading to more oil drilling, which will lead to more oil refining, toxic air pollution and greenhouse gas emissions. While BOEM quantifies the purported economic benefits of its proposal, such as job creation and value added impacts, BOEM wholly fails to quantify the negative impacts that would result, such as the quantity of air pollutants from refining and consuming the oil and gas to be extracted and the attendant societal and environmental costs of such emissions.[166] This is despite BOEM's prior quantification of harm caused by air emissions from oil and gas activities represented by dollars per ton for certain pollutants,[167] and a readily available tool to analyze the costs of the greenhouse gas emissions generated by BOEM's proposal—the social cost of carbon. The social cost of carbon was developed by the Interagency Working Group on Social Cost of Carbon, which was convened by the Council of Economic Advisers and the Office of Management and Budget. As explained in the Working Group's report:

> The purpose of the "social cost of carbon" (SCC) estimates presented here is to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO_2) emissions into cost-benefit analyses of regulatory actions that impact cumulative global emissions. The SCC is an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year. It is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change.[168]

The working group presents values for social costs from 2015 to 2050, ranging from $11 to $212 (in 2007 dollars per metric ton of CO_2).[169] The SCC demonstrates that the benefits of reducing carbon pollution are significant. For example, the proposed rules for reducing power plant carbon emissions calculated the climate benefits and health co-benefits to be $15.6 to $88

[166] Draft EIS at 4-402 to 4-405.
[167] *See e.g.*, Draft Proposed Program at B-8 (referencing OECM which quantifies the economic cost of air pollutants, including NOx, SOx, PM10 and PM2.5, carbon monoxide, and VOCs). Industrial Economics, Inc., Applied Science Associates, Inc.; Northern Economics; and Dr. Nicholas Z. Muller. 2012. Forecasting Environmental and Social Externalities Associated with OCS Oil and Gas Development: The Revised Offshore Environmental Cost Model (OECM) (BOEM 2012-025).
[168] Interagency Working Group on Social Cost of Carbon, United States Government, Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866, May 2013, *available at* https://www.whitehouse.gov/sites/default/files/omb/inforeg/social_cost_of_carbon_for_ria_2013_update.pdf.
[169] Interagency Working Group on Social Cost of Carbon, United States Government, Technical Support Document: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis Under Executive Order 12866 at 2-3 (July 2015 revision), https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf.

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billion in 2020 and $32.3 to $151 billion in 2030.[170] However, recent studies have demonstrated that the numeric value assigned to the social cost of carbon vastly underestimates the true cost.[171] The social cost of carbon is therefore a minimum value.

Other analytical tools exist to evaluate the cost of methane emissions.[172] The Environmental Protection Agency has peer-reviewed and employed such a tool in its "Regulatory Impact Analysis of the Proposed Emission Standards for New and Modified Sources in the Oil and Natural Gas Sector."[173]

BOEM's quantification of the purported economic benefits of its proposal while assigning zero value to the social and environmental costs is both disingenuous and unlawful under NEPA. Moreover, its failure to adequately describe and quantify these negative impacts does not comply with its duty to disclose the environmental justice implications.

BOEM's analysis of the cumulative impacts of its proposal on environmental justice communities is inadequate for the same reason. Indeed, BOEM seems to dismiss the import of the additional air pollution that could result from its proposal on Gulf communities because there is already significant OCS-related infrastructure in the Gulf states. This approach undercuts the entire purpose of a cumulative impacts analysis and efforts to inform and engage environmental justice communities.

X. BOEM Should Not Propose Additional Lease Sales Until it Completes Section 7 Consultation under the ESA

CBD, BL, GRN, LBB, RAHC-14

BOEM should complete consultation under the ESA before proposing new lease sales. In enacting the ESA, Congress recognized that certain species "have been so depleted in numbers that they are in danger of or threatened with extinction."[174] Accordingly, a primary purpose of the ESA is "to provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, [and] to provide a program for the conservation of such . . . species."[175]

To reach these goals, Section 9 of the ESA prohibits any person, including any federal agency, from "taking" any endangered species without proper authorization through a valid

[170] EPA, Regulatory Impact Analysis Technical Document EPA-452/R-14-002 (June 2014).
[171] F. Ackerman & E. Stanton, Climate Risks and Carbon Prices: Revising the Social Cost of Carbon, in Economics, vol. 6 (Apr. 4, 2012) (the social cost of carbon could be almost $900/tCO2 in 2010, rising to $1,500/tCO2 in 2050).
[172] Marten A.L., Kopits K.A., Griffiths C.W., Newbold S.C., Wolverton A. 2015. "Incremental CH4 and N2O mitigation benefits consistent with the US Government's SC-CO2 estimates," Climate Policy 15(2):272-298.
[173] USEPA, Social Cost of Carbon, *available at* http://www3.epa.gov/climatechange/EPAactivities/economics/scc.html (noting application of social cost of methane supported by peer review); USEPA, Regulatory Impact Analysis of the Proposed Emission Standards for New and Modified Sources in the Oil and Natural Gas Sector, Ch. 4, available at http://www3.epa.gov/airquality/oilandgas/pdfs/og_prop_ria_081815.pdf.
[174] 16 U.S.C. § 1531(a)(2).
[175] *Id.* § 1531(b).

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incidental take permit.[176] The term "take" is statutorily defined broadly as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."[177] The definition of "harm" has been defined broadly by regulation as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering."[178] Courts have found federal agencies liable for take of listed species where agency-authorized activities resulted in the killing or harming of ESA-listed species.[179]

Additionally, Section 7(a)(2) of the ESA requires federal agencies to "insure that any action authorized, funded, or carried out by such agency . . . is not likely to jeopardize the continued existence of any [listed] species or result in the destruction or adverse modification of [the critical] habitat of such species."[180] "Action" is broadly defined to include "all activities or programs of any kind authorized, funded, or carried out, in whole or in part" by federal agencies and include granting permits and licenses, as well as actions that may directly or indirectly cause modifications to the land, water, or air.[181]

To facilitate compliance with Section 7(a)(2), an "agency shall . . . request" from the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (the "Services") information regarding whether any listed species "may be present" in a proposed action area, and if so, the "agency shall conduct a biological assessment" to identify species likely to be affected.[182] The agency must then initiate formal consultation with the Services if a proposed action "may affect" any of those listed species.[183]

After formal consultation, the Services issue a biological opinion to determine whether the agency action is likely to "jeopardize" any species' existence. If so, the opinion may specify reasonable and prudent alternatives that avoid jeopardy.[184] If the Services conclude that the action or the reasonable and prudent alternatives will not cause jeopardy, the Services will issue an incidental take statement ("ITS") that specifies "the impact, i.e., the amount or extent, of . . . incidental taking" that may occur.[185] When those listed species are marine mammals, the take must first be authorized pursuant to the MMPA, and the ITS must include any additional

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176 16 U.S.C. § 1538(a)(1)(B); *see also* 50 C.F.R. § 17.31(a) (extending the "take" prohibition to threatened species managed by the U.S. Fish and Wildlife Service).
177 16 U.S.C. § 1532(19).
178 50 C.F.R. § 17.3; *see also Babbitt v. Sweet Home Ch. Of Communities for a Great Oregon*, 515 U.S. 687 (1995) (upholding regulatory definition of harm).
179 *See e.g.*, *Defenders of Wildlife v. Envtl. Prot. Agency*, 882 F.2d 1294, 1300-01 (8th Cir. 1989); *Strahan v. Coxe*, 127 F.3d 155, 163 (1st Cir. 1997).
180 16 U.S.C. § 1536(a)(2); 50 C.F.R. § 402.14(a).
181 50 C.F.R. § 402.02.
182 16 U.S.C. § 1536(c).
183 50 C.F.R. § 402.14(a); 51 Fed. Reg. 19,926 (June 3, 1986) ("may affect" broadly includes "[a]ny possible effect, whether beneficial, benign, adverse or of an undetermined character").
184 16 U.S.C. § 1536(b); 50 C.F.R. § 402.14(h)(3).
185 50 C.F.R. § 402.14(h)(3).

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measures necessary to comply with the MMPA take authorization.[186] The take of a listed species in compliance with the terms of a valid ITS is not prohibited under Section 9 of the ESA.[187]

But an agency's consultation duties do not end with the issuance of a biological opinion. Instead, an agency must reinitiate consultation when: (1) the amount of take specified in the ITS is exceeded; (2) new information reveals that the action may have effects not previously considered; or (3) the action is modified in a way not previously considered.[188] Finally, after consultation is reinitiated, ESA Section 7(d) prohibits the agency from "mak[ing] any irreversible or irretrievable commitment of resources" toward a project that would "foreclos[e] the formulation or implementation of any reasonable and prudent alternative measures."[189] The 7(d) prohibition "is in force during the consultation process and continues until the requirements of section 7(a)(2) are satisfied."[190]

As recognized in BOEM's Draft EIS, several federally threatened and endangered species are found in the Gulf of Mexico and may be impacted by its leasing proposal; the proposal also impacts critical habitat for ESA-listed species. Thus, Section 7 of the ESA is clearly triggered.

While BOEM engaged in Section 7 consultation on its Five-Year Program for offshore oil and gas leasing in the Gulf of Mexico from 2007-2012, and reinitiated Section 7 consultation following the Deepwater Horizon oil spill, it has not yet completed such consultation. Instead, BOEM is relying on a biological opinion issued by the National Marine Fisheries Service in 2007 that fails to consider the impacts of climate change and does not any impacts of offshore oil and gas activities on several ESA-listed species or their critical habitat in the Gulf of Mexico.[191]

Accordingly, BOEM should not propose further lease sales and should suspend approval of leasing and site-specific drilling activities until consultation is complete. Such action is necessary to ensure that its actions do not result in the unauthorized take of listed species, do not jeopardize listed species or their critical habitat, and that such approvals do not "foreclos[e] the formulation or implementation of any reasonable and prudent alternative measures."[192]

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186 *Id.*
187 16 U.S.C. §§ 1536(b)(4), (o)(2); 50 C.F.R. § 402.14(i)(5).
188 50 C.F.R. §§ 402.16; 402.14(h)(3).
189 16 U.S.C. § 1536(d).
190 50 C.F.R. § 402.09.
191 *See e.g.*, NMFS, Final Recovery Plan for Elkhorn (*Acropora palmata*) and Staghorn Coral (*A. cervicornis*), Mar. 2, 2015 (noting corals vulnerability because of climate change and the need to reduce greenhouse gas emissions); Veron, J.E.N., O. Hoegh-Guldberg, T.M. Lenton, J.M. Lough, D.O. Obura, P. Pearce-Kelly, C.R.C. Sheppard, M. Spalding, M.G. Stafford-Smith, and A.D. Rogers. 2009. The coral reef crisis: the critical importance of <350ppm CO_2. Marine Pollution Bulletin 58: 1428-1436; Monaco, Mark E., Jeannette Waddell, Alicia Clarke, Chris Caldow, Christopher F.G. Jeffrey, Simon Pittman, editors. 2008. Status of the coral reef ecosystems in the U.S. Caribbean and GulfofMexico: Florida, Flower Garden Banks, Puerto Rico, Navassa and USVI. In Wilkinson, Clive, editor. Status of Coral Reefs of the World: 2008. Global Coral Reef Monitoring Network and Reef and Rainforest Research Centre. Townsville, Australia, pp. 225-238; Hawkes, L.A. et al. 2009. Climate change and marine turtles. Endangered Species Research 7:137-154; Rizkalla, C. E., and A. Savage. 2011. Impact of seawalls on loggerhead sea turtle (Caretta caretta) nesting and hatching success. Journal of Coastal Research 27:166- 173; Witt, M.J. et al. 2010. Predicting the impacts of climate change on a globally distributed species: the case of the loggerhead turtle. Journal of Experimental Biology 213:901-911.
192 16 U.S.C. § 1536(d).

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Center for Biological Diversity, Bold Louisiana, Gulf Restoration Network, Louisiana Bucket Brigade, Radical Arts and Healing Collective (continued)

XI. Conclusion

In sum, BOEM's leasing proposal would cause a wide variety of serious harms to the environment, including greenhouse gas emissions that will exacerbate climate change, oil spills, and further impacts to already imperiled wildlife and local communities, many of which are still suffering the effects of the Deepwater Horizon oil spill six years later. Accordingly, we urge BOEM to adopt the no-action alternative, end new offshore oil and gas leasing, and keep dirty fossil fuels in the ground.

If BOEM nevertheless decides to proceed with its proposal, it must first address and remedy the numerous deficiencies within the Draft EIS and must circulate a revised Draft EIS for public comment. BOEM's new NEPA analysis must, among other revisions, take the requisite hard look at the impacts of its leasing proposal by quantifying and analyzing the greenhouse gas emissions that could result from the consumption of oil and gas to be extracted under its proposal. BOEM must also analyze a reasonable range of alternatives, including an alternative that considers halting all new offshore oil and gas leases to avoid the most catastrophic impacts of climate change, and must adequately consider and disclose the environmental justice impacts of its proposal.

Sincerely,

/s/ Kristen Monsell

Kristen Monsell, Staff Attorney
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Cherri Foytlin, Director
Bold Louisiana

Cynthia Sarthou, Executive Director
Gulf Restoration Network

Anne Rolfes, Founding Director
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Jayeesha Dutta, Co-founder
Radical Arts and Healing Collective

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Consumer Energy Alliance

Submitted by
Brent Greenfield
Consumer Energy Alliance

Meeting on Draft Multisale Environmental Impact Statement for Proposed 2017-2022 Gulf of Mexico OCS Oil and Gas Lease Sales

Bureau of Ocean Energy Management
May 9, 2016
Beaumont, TX

Good afternoon. My name is Brent Greenfield, and I'm speaking today on behalf of Consumer Energy Alliance. Consumer Energy Alliance represents producers and consumers of energy from every sector of the economy, with more than 400,000 individual supporters across the United States and tens of thousands right here in Texas. From everyday citizens to truckers, manufacturers, farmers, and beyond, our members and the American public at large depend on access to affordable, reliable energy – and the products it produces – in order to meet our daily needs, sustain and create jobs, and power the economy.

In recent years, the domestic energy revolution has provided a major boost to the American economy and consumer pocketbooks, while fundamentally transforming the global geopolitical landscape to the benefit of U.S. national security. At the same time, thanks to continuing improvements in technology, practices, and oversight, the United States has demonstrated that offshore energy development and environmental stewardship can and do coexist.

Consumer Energy Alliance understands that to meet our long-term energy needs we will need access to all of our resources, including oil and natural gas, nuclear, solar, wind, and beyond. We also understand that oil and natural gas will continue to be a critical and dominant part of that mix for decades to come. The federal government understands this as well, as underscored by the Energy Information Administration's forecast last year that the contribution of oil and natural gas to our nation's energy portfolio will be virtually unchanged in 2040 compared to 2013.

CEA-1

Make no mistake, the Gulf of Mexico is an energy powerhouse for Texas, the Gulf Coast region, and the entire country, supplying nearly 20% of the nation's crude oil. It is also an economic powerhouse. In FY 2014 alone, Gulf of Mexico oil and gas activity supported 651,000 jobs, generated over $64 billion in Gross Domestic Product, and provided over $7 billion in revenue to the federal government.

Consumer Energy Alliance (continued)

CONSUMER ENERGY ALLIANCE

In addition, the federal government itself has concluded that not including the Gulf of Mexico in the next leasing program would cause billions of dollars in environmental and social costs, with imports having to replace nearly 60% of foregone production.

As Pres. Obama said last year, "I would rather us – with all the safeguards and standards that we have – be producing our oil and gas, rather than importing it, which is bad for our people, but is also potentially purchased from places that have much lower environmental standards than we do."

Consumer Energy Alliance agrees. Indeed, industry and regulators alike have taken a number of actions in recent years that have further strengthened the safety of offshore operations in U.S. waters, including what the Interior Department has referred to as "the most aggressive and comprehensive reforms to offshore oil and gas regulation and oversight in U.S. history."

CEA-2 Contrary to assertions by a small but vocal group of anti-energy groups, we can protect our environment AND meet our energy needs. As but one example, CEA notes the draft EIS recognition of this reality in its conclusion that Gulf lease sale activity would include beneficial impacts for commercial and recreational fishing and recreational resources.

For all these reasons, EIS alternatives that would cancel Gulf of Mexico lease sales or further reduce or restrict the areas available for leasing are simply not an option.

CEA-3 On behalf of energy consumers across Texas, the Gulf Coast region, and the entire nation, Consumer Energy Alliance urges the Interior Department to ensure that all Americans are able to affordably heat their homes and feed their children. An "all of the above" approach to energy policy is the only sensible solution, and that must include the Gulf of Mexico.

CEA-4 That is why we urge the Interior Department to include valuable offshore opportunities in the Gulf of Mexico, finalize a Multisale EIS that allows Gulf lease sales to proceed without any further exclusions or restrictions, and reject any demands to take actions that would in any way delay, restrict, or prohibit 2017-2022 lease sales in the Gulf of Mexico.

The Ehrhardt Group

U.S. Department of the Interior
Bureau of Ocean Energy Management

BOEM
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Public Meetings for the
Draft Multisale Environmental Impact Statement
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Though we have plenty of supply right now, we cannot take for granted the growing demand for energy as the world develops.

Even in the best-case-scenario predictions renewables can only provide 6% of the projected energy need. Oil and gas is the only resource capable of meeting the energy need.

EG-1 Lease sales are not about today but rather the future. Oil and gas exploration and cultivation are critical to our future.

I support the current preferred proposal for lease sales in the Gulf of Mexico. Exploration must continue in the western and central blocks of the Gulf of Mexico.

We must continue allowing energy companies to further develop their practices, perfecting their operations – getting cleaner, and more efficient than they already are.

Name: Caitlin Switzer
Title: Account Manager
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Address: 365 Canal Street
City, State, & Zip Code: New Orleans, LA 70130

Comments are not limited to the space on this sheet. Please feel free to add additional sheets if necessary.

Gulf Coast Group of the Mississippi Sierra Club

Comment by Steve Shepard

STEVE SHEPARD:

Okay. My name is Steve Shepard. I am the Gulf Coast Group Chair of the Mississippi Sierra Club.

GCGMSC-1

I am unhappy with the notion of more oil and gas lease sales because of the propensity of oil spills, plus having a spill from 2004, the Taylor Spill, that has not ever been stopped. And I obviously have a fear that as we drill deeper and in more difficult places, that we will be seeing more and more of these spills, which are accumulating and causing our Gulf to lose its previous productivity.

I personally fish a lot. I have shrimped in my life. I have crabbed in my life. I've spent decades, literally, and watched the water, and I'm seeing a shocking decline in the -- just total number of sea life I should say. It's not any one sea life. It's a general decline in numbers of sea life per gallon of water. I've -- since 2013 I've seen a decline in the crabs, flounders, speckled trout, numerous other species that

Gulf Coast Group of the Mississippi Sierra Club (continued)

are not commercially significant. And I believe that the 2013 change was caused by the BP spill.

GCGMSC-2

I am very upset to be living through the Shell Oil spill. It's one spill on top of another. We should stop that. And in a more specific way, just looking at your Central Planning Area, I object to the fact that Mississippi has open for leasing waters all the way essentially to the barrier islands. I know it's probably three miles outside the barrier islands. But there is a push to establish drilling rigs close to Mississippi waters and also to Mobile Bay.

I think we should do the same thing that Baldwin County has, which is a moratorium near shore. At least that. Obviously, we also don't want the deepwater drilling.

I feel like the oil industry has a three strikes and you're out situation, because the Taylor spill 2004, the BP spill 2010, and now the Shell Oil spill 2016. These are major spills. I'm under the impression there are also minor spills happening all the time. Enough is enough.

Gulf Coast Group of the Mississippi Sierra Clubv

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

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If we did not see a change in what our water is producing, our productivity, our fertility, we might tolerate drilling for a little longer. But since we are seeing a decline, I would hope that we would not lease any more bottomlands that haven't already been developed. We have lots of developed bottomland out there. We know it's unrealistic to try to stop what's already there, but we shouldn't have any more. I mean, we should keep it in the ground as has been said.

So thank you very much.

- - -

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Gulf Restoration Network

U.S. Department of the Interior
Bureau of Ocean Energy Management

BOEM

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Comments: PLEASE PRINT

GRN-1
Gulf Restoration Network is dissapointed in the lack of "no action alternative" research in the EIS. A through exploration of a no-action alternative is essential to ensuring that are Gulf communities, waters, and wetlands are protected.

GRN-2
There are currently enough leases to meet energy and market demands. Further permits of [illegible] for new leases

GRN-3
We have seen numerous leaks from existing or plugged wells in the Gulf. Until these leaks can be studied on a cummulative level, pursuing new drilling is irresponsible and does not allow for comprehensive risk analysis in the EIS of this size.

GRN-4
Additionally hosting public comment opportunities after work hours, and in a location accessible by public transit is appreciated and allows for full community participation.

Name: Johanna de Graffenreid
Title: Coastal Campaign Organizer
Organization: Gulf Restoration Network
Address: 330 Carondelet St., Floor 3
City, State, & Zip Code: New Orleans, LA

Comments are not limited to the space on this sheet. Please feel free to add additional sheets if necessary.

Gulf Restoration Network (continued)

Comment by Howard Page

HOWARD PAGE:

Again, my name is Howard Page. Well, I'm with the Gulf Restoration Network, and I have a number of concerns.

GRN-5

One, I would like to ask that we issue no new leases. 19 percent of the leases are being drilled right now. Extracted. That means 81 percent of our present capacity isn't even being used. So I would like to see a policy of no new leases

GRN-6

and then also a real look at improved safety on the rigs.

There's another major disaster right now with Shell going on, and it just continues to show that the rigs are not properly monitored for leaks. That Shell leak was discovered by an airplane flying over. The rig did not know it was leaking. That pipeline did not know it was leaking. It was discovered by an airplane.

GRN-7

There needs to be better monitoring of the pipelines to find the leaks in real time.

There needs to be better response plans. Right now they're recovering very little of the oil from that rig. The seas are

Gulf Restoration Network (continued)

a little rough out there right now. They're only using boom, and the water is overtopping the boom. They're mostly recovering seawater with a little bit of oil in it, and they're losing a lot of the oil. And it, as usual, will just spread and spread and get bigger and bigger and thinner and thinner. That's what oil spills do. It can go out to just a few millimeters in thickness and in a very large size, which kills a lot of life because it covers the whole ocean.

GRN-8

So, again, much better emergency response plans need to happen with real assets that are really available, not just a few boom ships.

GRN-9

Also more access needs to be given to coverage the these events. The press needs to be given full, unrestricted access to any spill.

GRN-10

The Coast Guard or U.S. Government should be entirely in control of a cleanup. It should not be the corporation that destroyed the water. They should not be responsible for their own cleanup. BOEM, the Coast Guard, Department of the Interior, some

Gulf Restoration Network (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

U.S. official need to come in and be completely in charge of all assets and just send the bill to the responsible party. The responsible party should not be allowed to minimize the cost of cleanup.

GRN-11

The environmental justice impacts of oil drilling need to be better considered. Recent accidents have really devastated our fishing industry. They've also devastated our tourism industry. Our dolphin populations are the worst they've ever been, with incidents of infant mortality. Our turtle populations have been harmed. Our oysters are in terrible shape. And our fisherman are suffering from this as well as the tourist industry when people kind of question do they want to come to an area that's known for tarballs and known for dying dolphins and known for bad oyster populations where you can't even eat the local oysters anymore.

So these are the economic effects of poorly-managed oil drilling, and we need to have much better oversight on this from an environmental justice point of view. Because, as the BP disaster proved, none of the

Gulf Restoration Network (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

GRN-11

restoration money went to the fishermen, or incredibly little. The fishermen were hugely damaged. They've received very little, if any, compensation. And their -- their resource that their lives depend on continues to be damaged. But BP has not compensated them at all.

And as these continuing accidents happen, like Shell, the fishermen continue to have their resource harmed. So I would ask that, too, is that the economic impact to fishermen and other coastal communities that are often environmental justice communities, that that be looked at.

One more.

GRN-12

The Bureau of Energy Management needs to focus much more on locating offshore wind resources in the Gulf of Mexico. Economics should not be the only factor. Offshore wind is viable in the Gulf of Mexico. It needs to be part of a diverse energy mix, and it certainly needs to be part of a strategy to deal with climate change.

\- - -

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Louisiana Mid-Continent Oil and Gas Association

MS. MELISSA CLOUTET:

My name is Melissa Cloutet, and today I'm making comments on behalf of the Louisiana Mid-Continent Oil & Gas Association, LAMOGA. We appreciate the opportunity to submit comments in response to the OCS Oil & Gas Leasing Program 2017-2022 Draft Programmatic Environmental Impact Statement.

LAMOGA is Louisiana's longest-standing trade association exclusively representing all aspects of the oil and gas industry onshore and offshore, including exploration, production, midstream activities, pipeline, refining and marketing.

LAMOGA-1

LAMOGA fully supports a continued robust OCS leasing program in the Gulf of Mexico, and we support Alternative A proposed action of the Draft EIS.

While the Draft EIS evaluates the economic, environmental and social impacts of the proposed action, it should be noted that the offshore oil and gas industry is an integral part of Louisiana's economy, our society and our coastal sequestration efforts. Combining the offshore sector with related pipeline and refining activities, the oil and gas industry has a $70-billion total impact to Louisiana. The Gulf of Mexico provides 20 percent of the nation's crude oil supply, performing an essential service to

Louisiana Mid-Continent Oil and Gas Association (continued)

meet the nation's energy needs.

In Fiscal Year 2014, Gulf of Mexico Energy Development supported 651,000 jobs, contributed over $64-billion in GDP and provided over $7-billion in revenue to the federal government. In fact, federal revenue from offshore energy production in the past 10 years totaled $80-billion in lease sales and royalties, a major source of revenue for our country.

Louisiana has a successful history in offshore oil and gas production, and operators here offer a real-world perspective as to the positive impacts of a safe and responsible oil and gas industry on our economy and environment. Louisiana has demonstrated firsthand how to balance the development of our nation's oil and gas resources off its coast and still maintain a robust hunting, fishing and wildlife industry.

In Louisiana, commercial fishing provides one-fourth of the fisheries' catch in the lower 48 states, and our wetlands provide habitat for about 1.8-million migratory waterfowl. Wildlife recreation, which includes hunting, fishing and wildlife watching, has amounted to a $2-billion industry.

As a result of the 2006 Gulf of Mexico Energy Security Act, Louisiana, Texas, Mississippi and

Louisiana Mid-Continent Oil and Gas Association (continued)

BOEM MEETING May 12, 2016 Page 4

Alabama will receive 37.5 percent of royalties received from new oil and gas developments in federal waters adjacent to their state, and in 2017, that will expand to include a portion of all lease sales receipts since December 2006.

Beginning in 2017, Louisiana will receive nearly $200-million per year through OCS revenue sharing that is dedicated to the Louisiana coast and projects to protect it. GOMESA was designed to ensure that the states have adequate resources for coastal restoration, conservation and hurricane projects.

The offshore oil and gas industry in the Gulf of Mexico has proven to provide long-lasting, economic and energy security benefits not only to Louisiana, but also to the entire nation. These are direct benefits that the states across our country could experience with the opening of additional OCS territories for energy development. For the benefit of the nation, LAMOGA respectfully requests that BOEM continue to provide leasing opportunities in the Gulf of Mexico as well as expand to other OCS areas, including the Eastern Gulf of Mexico.

LAMOGA-2

LAMOGA appreciates the opportunity to provide comments on the programmatic environmental impact statement. We look forward to participating in

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Louisiana Mid-Continent Oil and Gas Association (continued)

BOEM MEETING May 12, 2016 Page 5

this important plan development process.

Thank you.

Testimony removed here to focus on the comment above. Please refer to the comment from Renate Heurich to see the removed testimony.

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Lone Star Chapter of the Sierra Club

1202 San Antonio

Austin, Texas 78701

June 5, 16

Comments from the Lone Star Chapter of the Sierra Club on the Draft EIS for the Gulf of Mexico Oil and Gas Lease Sales, 2017-2012

The Lone Star Chapter of the Sierra Club appreciates the opportunity to comment on the Draft EIS for the Gulf of Mexico Oil and Gas Lease Sales, 2017-2022. We were happy to participate in the public meeting held in Beaumont on May 9th. As the state chapter of the largest conservation organization in the United States, with over 22,000 members in Texas, including local groups in Corpus Christi, the Valley, The Golden Triangle, and Houston, our members view the Draft EIS as an important step in the decision on whether or not to allow further drilling in the Gulf Region.

LSCSC-1 First of all, we were appreciative of the decision by the Obama Administration to remove future leasing and drilling for the 2017-2022 for the Atlantic Region, and some areas within the Arctic that were originally considered as part of the overall plan for ocean drilling.

LSCSC-2 Second, we want to state upfront our concerns with continued drilling in the Gulf, as contemplated in this EIS. Even without future leases, there are existing leases for much of the Gulf that will continue to operate, and BOEM must consider the impact of these existing leases as part of the process of looking at its future potential leasing. BOEM has already leased over 23 million acres of the Gulf to oil companies, and nearly three million acres of the Alaskan Arctic. Many of the leases in the Gulf of Mexico are relatively new leases, meaning that, by BOEM's own admission, production under these leases will last up to 70 years. BOEM's analysis wholly fails to consider why the OCS areas already under lease are not sufficient to supply the nation's energy needs while we transition away from dirty fossil fuels and toward clean, sustainable energy.

LSCSC-3 Third, BOEM seems to be offering a false choice. The options analyzed under the DEIS seem to be full leasing, leasing in one of the zones or none essentially. There seems to be little consideration of very limited zones for drilling, or increased no-drill zones. Instead, BOEM is relying on its large "Western," "Central" or "Eastern" zones and little ability to limit areas within those areas. While Option D offers some variability by adding

Lone Star Chapter of the Sierra Club (continued)

some restrictions on drilling in certain areas, again it is a very limited option with no consideration of other options.

NEPA requires a "detailed statement" of "alternatives to the proposed action," which is considered "the heart of the environmental impact statement." But BOEM's alternatives analysis is seriously lacking. Even if BOEM properly limited its purpose and need statement (which it did not), BOEM unreasonably failed to consider alternatives that would restrict oil and gas development, even if they would have met the "need" of holding lease sales to further the development of OCS oil and gas resources. For example, BOEM failed to consider an alternative that would prohibit drilling in certain biologically sensitive areas, such as critical habitat for imperiled loggerhead sea turtles; an alternative that would restrict the number of wells to be drilled; or an alternative that would end all new offshore oil and gas leasing pending a plan to limit warming to 1.5° or 2°C.

Overall Comments

LSCSC-4 The Lone Star Chapter Believes That the No New Leasing – Option E – is the Option the Administration Should Pursue

LSCSC-5 Climate change, driven primarily by the combustion of fossil fuels, poses a severe and immediate threat to the health, welfare, ecosystems and economy of the United States and the world. In recognition of these threats, the Paris Agreement—adopted by 197 countries, including the United States—codifies the international, scientific consensus that climate change is an "*urgent and potentially irreversible threat to human societies and the planet* and thus requires the widest possible cooperation by all countries." The Agreement commits the signatories to hold global average temperature "to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels." This requires rapid and robust emissions reductions. Halting new oil and gas leases off our coasts would keep up to 62 billion tons of carbon emissions in the ground—the pollution equivalent of more than 16,000 coal-fired power plants.

BOEM's proposal to lease over 70 million acres of the Gulf of Mexico so that oil and gas companies can drill up to 9.5 billion barrels of oil equivalent over the next 70 years will deepen the climate crisis and reverse course on President Obama's commitment to combat climate change. We urge you to halt all new oil and gas lease sales in federal waters, and keep these dirty fossil fuels in the ground.

LSCSC-6 Oil spills and air pollution from offshore drilling and industrial facilities like refineries that support the industry make people sick and disproportionately harm low-income neighborhoods and communities of color. But BOEM fails to adequately analyze the environmental justice impacts of its proposal. For example, BOEM dismisses the import of the additional air pollution that could result from its Proposal on Gulf communities because there is already significant OCS-related infrastructure in Gulf States. This

Lone Star Chapter of the Sierra Club (continued)

LSCSC-6

approach undercuts the entire purpose of a cumulative impacts analysis and efforts to inform and engage environmental justice communities, in violation of NEPA.

Alternative Analysis: Large Failure in EIS

LSCSC-7

BOEM has failed to consider alternative uses of the ocean that would also support the economic development of the Gulf without the adverse impacts of oil and gas leasing. First, the significant role of tourism, fishing and other recreational uses of the ocean are undervalued and the impact that oil and gas drilling has on these other ocean uses are not adequately considered.

LSCSC-8

BOEM has failed to consider the large potential for alternative energy development in the Gulf, including offshore wind, floating solar, tide and wave technology and associated onshore development. While BOEM had considered a 50-mile offshore wind zone in the Atlantic as part of the programmatic EIS, it has failed to consider the validity of a similar zone along the Gulf to promote the use of alternative energy. While care would be needed to assure protection of migratory mammal and bird species in the development of offshore wind, solar or wave technology, the potential economic development, energy production and job creation is enormous and should not be undermined for a fuel with such significant public health and environmental consequences. We know that in Texas, several wind companies have been looking at offshore wind at least within the state-owned water and they have found valid potential. Yet BOEM is not considering the potential that we could be impacting future renewable development by opening up parts of the Gulf for oil and gas development.

LSC-9

In addition, BOEM has failed to adequately analyze special places in the Gulf that deserve special protection. In addition to the needs of key species like sea turtles, and migratory birds, no leases should even be considered in, near or next to any topographic high marine ecosystems. Some of these topographic highs that should be provided additional buffer protection include East Flower Garden Bank, West Flower Garden Bank, Horseshoe Bank, Stetson Bank, Stetson Ring, Claypile Bank, 32 Fathom Bank, Applebaum Bank, Coffee Lump Bank, 28 Fathom Bank, McGrail Bank, Bright Bank, Rezak Bank, Geyer Bank, Elvers Bank, MacNeil Bank, Sonnier Bank, Bouma Bank, Sidner Bank, Parker Bank, Alderdice Bank, Jakkula Bank, 29 Fathom Bank and Rankin Bank. In particular, the Flower Garden Banks National Marine Sanctuary should have a large buffer areas around any potential lease block. The BP Deep Horizon disaster showed what can happen at and below the surface when large quantities of oil and gas are released. "Russian Roulette" should not be played with the long-term health of these important topographic high marine ecosystems.

LSC-10

While we recognize that there is a separate process going on to consider expansion of the Flower Garden Banks Sanctuary through a separate process, we would strongly insist that no development be considered in the area near a potential expansion. Indeed, we believe a large buffer area must be considered whatever the decision on expansion of the Flower Garden area is. As an example, currently NOAA is considering

Lone Star Chapter of the Sierra Club (continued)

LSCSC-10

five alternatives, with Alternative Five encompassing more than 930 square miles. BOEM should not consider any drilling in this large area.

As NOAA states in the justification of the expansion discussion, "Additional exploration in the northwestern Gulf of Mexico has identified other reefs, banks and associated features that may be ecologically linked to FGBNMS and may also be highly vulnerable to certain human caused impacts. Although many of these areas have some level of protection through other designations, inclusion in the sanctuary would provide a comprehensive management framework to fill in the existing regulatory gaps and provide necessary protection to these critical habitats."

LSCSC-11

The EIS does look at potential impacts on important species like turtles and migratory birds. However, the impacts are severely understated, particularly with regards to the impacts of major spills.

LSCSC-12

This EIS also fails to consider downstream greenhouse gas emissions. Downstream greenhouse gas emissions are precisely the kind of indirect effects that BOEM must consider in analyzing the impacts of its Proposal under NEPA. But BOEM's Draft EIS wholly fails to quantify the greenhouse gas emissions from burning the oil and gas to be extracted under its Proposal or consider the climate impacts of such emissions. In fact, much of this gas and oil will be refined directly in the Gulf Area. Moreover, because BOEM ignores these impacts, BOEM also fails to discuss how its Proposal can possibly be consistent with the Paris Agreement and efforts to limit warming to 1.5°C or even 2°C to avert the worst impacts of climate change. These failures violate NEPA.

BOEM has failed to adequately assess both nitrogen oxide and volatile organic compounds and their role in ground-level ozone formation in gulf communities that result from the upstream, proposed drilling and downstream uses of the products that would emerge from the ocean floor.
Nitrogen oxide and volatile organic compound emissions that cause ozone in areas like Houston, Galveston and Beaumont can not and should not be ignored in this draft multi-sale EIS. Specifically, the oil that would come out of the Gulf would most likely be refined in areas like Beaumont, Port Arthur, Harris County, Nueces County, as well as areas along the coast of Louisiana. To ignore these downstream impacts and downstream communities is a major failure of this EIS.

BOEM has underestimated the amount of climate change gases and their environmental impacts on human and natural landscapes. Past, present and future foreseeable actions and their impacts should be analyzed and considered in an EIS. Thus, past emissions that have led to the present level of greenhouse gases from drilling and associated activities should be part of the EIS since they impact our present and future course.

LSCSC-13

BOEM's Draft EIS fails to adequately describe baseline conditions related to climate change or consider the impacts of climate change on the ocean environment. While

Lone Star Chapter of the Sierra Club (continued)

BOEM acknowledges that climate change is occurring, its analysis is cursory and fails to properly disclose the enormity of the problem, or the contribution of expanded offshore oil drilling in the Gulf of Mexico, to the problem. For example, BOEM fails to adequately analyze the impacts of ocean acidification over the course of its Proposal, and its Proposal's contribution to these significant environmental problems.

LSCSC-13 BOEM admits that hurricanes and other extreme weather events can damage offshore oil and gas pipelines and infrastructure resulting in spills, but fails to analyze how increased storm severity in the face of climate change will increase the risks of oil spills, accidents and other environmental harms associated with offshore oil and gas drilling in the Gulf of Mexico. The failure to do so violates NEPA.

LSCSC-14 BOEM says the purpose and need of its analysis is to offer oil and gas lease sales so that oil and gas resources on the OCS can be developed. But the law clearly requires BOEM to analyze the impacts of dirty, dangerous offshore drilling on the Gulf's ecosystem, coastal communities and our climate *before* deciding whether to allow them, not the other way around. BOEM's backward approach reflects a fundamental misunderstanding of its legal obligations and an apparent desire to appease the oil industry at the expense of our ocean environment and climate.

LSCSC-15 BOEM must develop a climate change ecological resilience and resistance plan (CCERRP), assessing the full biological and ecological elements in the Gulf of Mexico and the affects that climate change has had and will have on them. A CCERRP would assist plants, animals and ecosystems to adapt to climate change and would require monitoring of changes and mitigation measure effectiveness.

LSCSC-16 BOEM has failed to adequately assess the impact of methane leaks from the upstream, proposed drilling and downstream use of these products, and its impact on both climate change and other public health impacts (such as ozone formation). At a minimum, if any drilling is ultimately authorized, BOEM must require robust VOC and methane leak detection and repair programs.

LSCSC-17 BOEM has repeatedly admitted that it lacks critical information regarding the effects of the Deepwater Horizon oil spill on the Gulf of Mexico. It has also repeatedly admitted that there are data gaps regarding numerous resources in the Gulf, including wetlands, coastal water quality, offshore water quality, air quality, commercial and recreational fishing and environmental justice, and that the impacts of the Deepwater Horizon oil spill on such resources may have changed baseline conditions. BOEM therefore cannot properly define the environmental baseline, and cannot conduct a proper NEPA analysis unless and until these significant data gaps are filled.

LSCSC-18 BOEM must analyze the impacts of a catastrophic oil spill. BOEM dismisses the impacts of a catastrophic oil spill because oil and gas activities are regulated and changes have been implemented since Deepwater Horizon. But this assumption ignores several federal studies published since the disaster finding that sufficient regulatory changes are still lacking. It also ignores the reality that transporting oil and gas is inherently

Lone Star Chapter of the Sierra Club (continued)

LSCSC-18 dangerous and spills occur as a matter of course in offshore oil and gas operations from both tankers and pipelines.

The Lone Star Chapter of the Sierra Club appreciates the opportunity to submit this testimony.

Sincerely,

Cyrus Reed
Conservation Director, Lone Star Chapter, Sierra Club

Mississippi Coalition for Vietnamese-American Fisher Folk and Families

U.S. Department of the Interior
Bureau of Ocean Energy Management

BOEM

Public Meetings for the
Draft Multisale Environmental Impact Statement
on Proposed OCS Oil and Gas Lease Sales in the Gulf of Mexico

COMMENT SHEET

Comments: PLEASE PRINT

MCVAFFF-1

We reiterate the great importance to extend the public comment deadline to 60 additional days. It is a extremelly lengthy, technical document that one needs translation & dissemination to the Vietnamese American fishing communities in the Gulf Region

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Address: 1636 Popps Ferry Rd. St. 223
City, State, & Zip Code: Biloxi, MS 39532

Comments are not limited to the space on this sheet. Please feel free to add additional sheets if necessary.

Mississippi Coalition for Vietnamese-American Fisher Folk and Families (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

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Comment by Thao Vu

THAO VU:

I'm here to submit my comments, concerns, and recommendations for the public record.

And, again, my name is Thao Vu, and I'm the Director of the Mississippi Coalition for Vietnamese American Fisher Folks and Families. We're a community-based organization based in Biloxi, Mississippi.

MCVAFFF-2

First of all, you know, I work with -- closely with a lot of the Vietnamese American fishing communities here in of Mississippi. And one of our key concerns is an accurate public notice, right, and that we think that right now, first of all, it's shrimping season in Louisiana and a number of the Fisher Folks are either shrimping in Louisiana or they're getting ready to go to Louisiana, right.

And they weren't aware of this very important hearing.

MCVAFFF-3

And another challenge is that many have language access, right, needs. They arrive here as adults in the Gulf and they didn't have an opportunity to obtain a higher education, so they have limited English

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Mississippi Coalition for Vietnamese-American Fisher Folk and Families (continued)

MCVAFF-3

proficiency.

They have challenges in terms of accessing computers and they are unaware of the Federal Register, right. And we don't think that any of their documents have been translated. We were informed earlier that nothing has been translated to Vietnamese, and -- and that -- and for those reasons and these -- this is just a summary, but we know the Environment Impact Statement is at least 700 pages or more.

MCVAFF-4

It's a very lengthy, technical documents, and because of all those challenges, you know, we are asking for this comment period to be extended 60 days. Adequate time to -- for outreach and disseminating this information and giving enough people -- giving people enough time to comment on it, right? So that's critically important, you know.

And then this past April 2000 -- you know, 2016, which marks the sixth year of the BP disaster, right. They always call it a spill, but it's not a spill. It's a huge disaster and it's ongoing. Not only was it

Mississippi Coalition for Vietnamese-American Fisher Folk and Families (continued)

MCVAFF-5

the largest environmental disaster, but it caused huge social, economic as well as health impacts and concerns, particularly for fishing communities along the Gulf. There are many in Louisiana, here in Mississippi, Alabama, Florida, and Texas. And they were disproportionately impacted by this disaster, and they still haven't recovered because the disaster really deeply devastated the Gulf of Mexico, its habitats, its fisheries, right. And the water has been greatly polluted.

And I'm actually holding a copy of -- this is a Natural Resource Damage Assessment that the Deepwater Horizon Trustee Council, they developed, right. And this is just a summary of it, but it actually assesses the full impact of the injuries and the damages of what happened, right, because of the BP disaster. All the marine life, the fisheries, the devastation to various, you know, marine life and fisheries and the habitats and -- and it's very devastating.

And then last week, it's horrible, because Shell had another -- Shell had a disaster, you know, and it didn't take place

Mississippi Coalition for Vietnamese-American Fisher Folk and Families (continued)

far from this BP disaster. And right now, like I mentioned earlier, there's a group of some fishermen, they are shrimping Grand Isle, Louisiana, which is only about maybe -- not far from Port Fourchon. And for the Shell disaster, where it happen, Shell Oil drilling disaster, and they're very -- they're very concerned.

And we heard that there is at least 500,000 gallons. It's five times larger than what we've been seeing in the media, where it showcase in the media, it's much larger than that. We're very concerned about the impacts to -- to our livelihoods and our communities.

And six years after BP, you know, there are great livelihoods sustainability concerns in all these communities, fishing communities.

MCVAFFF-6

We also want to -- we're very concerned about environmental injustices, because there's a principle -- you know, a principle is called environmental justice principles. And part of that means being able to meaningfully engage and participate, you know, and we believe that particularly for minority, underserved populations, where language access

Mississippi Coalition for Vietnamese-American Fisher Folk and Families (continued)

MCVAFFF-6

or computer access challenges, they haven't been meaningfully engaged and they still have -- they suffering from huge economic, social, and health impacts that hasn't been remediated, reduced.

MCVAFFF-7

And, you know -- and we think that the development of this Environmental Impact Statement, which I only have a small summary, but that larger one, 700 page or more, we think that in terms of development, that is a backward process and it causes more injustices, because we believe that you need to fully assess the impacts as well as the cumulative impacts to these communities who depend on healthy -- a healthy Gulf of Mexico, its ecosystems, the habitats, and its fisheries, right.

And if you're proposing a plan that they don't even know about or they can't access, that's even causing more injustices, right. And we believe that's very serious, right.

MCVAFFF-8

Lastly, we're very, very concerned that our federal and state agencies have not learned to implement the lessons learned and

Mississippi Coalition for Vietnamese-American Fisher Folk and Families (continued)

MCVAFF-8

best practices, right. For example, from -- after the Exxon Valdez, you know, oil disaster, the -- in Prince William Sound, they create a regional citizen advisory council, right. And that's to provide some citizen oversight and monitoring.

There is a great, great critical need to implement that -- establish that here for the Gulf -- for the Gulf Coast region, right. And it needs to be implemented now so we can have contingency programs to be able to prepare to -- you know, prepare and respond to other future disasters like the one we just had with Shell last week. Right. That is greatly, greatly needed and -- to have contingency programs in place and to have adequate infrastructure and cleanup workers are properly trained and to bee able to respond to that. And we believe that is greatly missing. That needs to be implemented right away.

And, in fact, after BP, there was a National Spill Commission. One of their key recommendations was the establishment of this Regional Citizen Advisory Council, and to this

Mississippi Coalition for Vietnamese-American Fisher Folk and Families (continued)

MCVAFF-8

day it hasn't been establish. So those are our -- some of our key concerns.

Thank you.

MCVAFF-9

So in terms of this BOEM public hearing the way it's structured, we don't think that it's a good process. A good process is actually just -- you could have a presenter and you could also have it rolling at the same time, and you could actually have materials and handouts for the public. Right. All of that.

But you need to set aside time for folks to be able to comment, an accurate time. Not just three minutes, but at least six minutes. Right. Because some of us may have to interpret for others who have language access problems, challenges. Right.

In addition, you know, the purpose of a public hearing is there for us to express our comments of our recommendations, our concerns, and everyone have equal access, opportunity to hear, right. And be informed about it.

And by setting -- by creating this structure and asking us to submit our comments to a court reporter, you know, without anyone

Mississippi Coalition for Vietnamese-American Fisher Folk and Families (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

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MCVAFFF-9

else being able to hear our comments, concerns and recommendations, we don't think -- we think that's not a fair or inclusive process. In fact, it's very exclusionary.

Thank you.

\- - -

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No New Leases Form Letter

6/8/2016 DEPARTMENT OF THE INTERIOR Mail - No New Offshore Oil and Gas Leases

Multisale EIS 2017-2022, BOEM <multisaleeis2017-2022@boem.gov>

No New Offshore Oil and Gas Leases
1 message

Christopher Porter <chrisporter10@icloud.com> Tue, Jun 7, 2016 at 11:37 AM
Reply-To: chrisporter10@icloud.com
To: multisaleeis2017-2022@boem.gov

Dear Chief Goeke,

NNL-1

I am writing to urge you to halt all new oil and gas lease sales in federal waters and keep these fossil fuels where they belong -- safely in the ground. The Bureau of Ocean Energy Management's proposal to lease more than 70 million acres in the Gulf of Mexico is absurd. Oil and gas companies would be allowed to drill our ocean for the next 70 years -- deepening the climate crisis and reversing course on President Obama's commitments to address this global problem.

NNL-2

Moreover, oil spills and air pollution from offshore drilling and industrial facilities like refineries make people sick and disproportionately harm low-income neighborhoods and communities of color. BOEM's proposal fails to adequately consider these impacts.

NNL-3

The agency's refusal to consider or disclose impacts from consuming and burning the oil and gas extracted under its proposal is also morally and legally unjustifiable. BOEM cannot ignore the harmful climate effects of its proposal, or whether it's consistent with the Paris Agreement and efforts to limit global warming to 1.5 or 2 degrees Celsius.

NNL-4

And finally, offering new offshore oil and gas leases puts marine wildlife and our coasts at risk of oil spills and other damage. The Gulf of Mexico is still reeling from the Deepwater Horizon disaster. New offshore oil development will accelerate deepwater drilling and fracking, increasing the risk of yet more accidents and spills -- and again, BOEM's proposal fails to sufficiently analyze these threats.

NNL-5

That's why BOEM must adopt the no-action alternative and end new oil and gas leasing in federal waters. It's the right policy move and now is the right time.

Sincerely,

Christopher Porter
24 Grange Avenue
Wallasey, ot Ch45 5Dr
GB

https://mail.google.com/mail/b/377/u/0/?ui=2&ik=5765db2e66&view=pt&search=inbox&th=1552bba295e13ed8&siml=1552bba295e13ed8 1/1

OffshoreAlabama.com

Comments before BOEM
May 18th, 2016
Mobile, AL.

Good afternoon, I am here to express my support on the draft EIS for the proposed 2017-2022 Gulf of Mexico OCS Oil and Gas Lease Sales. My name is Steve Russell and I represent *OffshoreAlabama.com*, a partnership of over 220 companies in Alabama who are involved in the supply and support of the offshore oil and gas industry.

Members of *OffshoreAlabama.com* and some of the jobs they represent are directly impacted by the future of offshore oil and gas drilling and production in the Gulf of Mexico. Opening up new areas for exploration will create hundreds of local jobs at a time when Mobile County's unemployment rate is 7.0 % (March 2016).

OAL-1

Continuing with this process of not delaying, restricting or prohibiting the 2017-2022 Gulf of Mexico lease sales will have 2 major benefits for Mobile County:

First, expend capital investment and capital investment means more county and state sales and property taxes and school taxes on equipment and machinery;
Secondly, put hundreds of local people to work boosting household incomes: we know thru surveys that the average annual wage for oil & gas workers in Mobile County exceeds \$60,000, significantly higher than the \$42,097 (October 2015, ADOL) average annual earnings in Mobile County. Higher paying jobs means more taxes and it also means that their families spend more money in the community on all kind of goods and services, benefiting even more people and putting money in their pockets.

OffshoreAlabama.com (continued)

OAL-1

Finalizing a multiscale EIS that allows Gulf lease sales to proceed without any further exclusions or restrictions is important to sustaining the health of the Mobile economy.

Steve Russell
OffshoreAlabama.com
451 Government Street
Mobile, AL. 36602
251.431.8654

Restore Mississippi Sound

Comment by Sharon Hayes (Restore Mississippi Sound)

SHARON HAYES:

Well, thank you for the opportunity to comment.

I'm Sharon Hayes, an ecological economist, who retired not long ago from the Environmental Protection Agency in Washington, D. C. While working there, among other things, I managed the water policy staff, reporting to the assistant administrator for water, and managed the regulatory development process for the Office of Water. In that role I reviewed or contributed to many economic impact analyses and am very familiar with the cost benefit process.

I have also taught ecological and environmental economics at the University of Maryland, at Dominican University in San Rafael, California, and I am currently teaching economics at the University of Southern Mississippi.

I am here today not only to offer comments on the programmatic economic analysis supporting the 10 lease sales in the Gulf of Mexico; I'm also here as the Director of

Restore Mississippi Sound (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

Restore Mississippi Sound, a group of concerned citizens that advocates for healthy water abundant aquatic life in the Gulf and the Sound along with increased tourism revenues and jobs that go with them.

BOEM concludes in the programmatic EIS that the environmental and social costs associated with the no-drill, no-lease option are several times higher than the cost of the preferred option; that is, leasing 10 well sites in the Gulf of Mexico over the next 10 years. Hence, the decision to drill.

In reviewing the EIS and supporting documentation, I have discovered that the analysis supporting this decision is flawed so significantly as to call that decision into question. While I have identified a number of different issues during my short time, I'll refer to only two: BOEM's characterization of the baseline health of the Gulf and cumulative effects and the net benefits calculation.

RMS-1

The EIS seriously underestimates the health of the Gulf and its aquatic life. It underestimates the impacts of the BP oil spill, the amount of oil and the dispersant

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Restore Mississippi Sound (continued)

RMS-1

remaining in the water, and their effects on marine mammals, fish, and other aquatic life.

The analysis says that the probability of another large spill is so small that its possible effects are not considered in the EIS. And the model that they used to assess the impacts of oil spills, SYMAP, is not designed to handle large spills. Given that they use that model, it would be overwhelmed if they -- if they considered the damaging effects of large spills.

RMS-2

The EIS also doesn't include reference to the Taylor Energy Spill in the Gulf caused by Hurricane Ivan in 2006. Currently discharges over 90 gallons per day for over 10 years, and there is no end in sight.

RMS-3

The potential impact of storms on oil discharges is not considered in the EIS as well as problematic since millions of gallons were spilled from pipes in the Gulf during Katrina and Rita, and almost 200 platforms were either destroyed or badly damaged.

RMS-4

Most recently we have the Shell Oil Spill. This past week observers who flew over the spill believe that it was actually several

Restore Mississippi Sound (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

RMS-4

times larger than originally reported.

The EIS also does not describe the health -- the EIS does describe the health of the Gulf in general terms, citing the excess nutrients that flow down the Mississippi River into the Gulf, the consequent dead zone, the discharge of bacteria and toxins and other pollutants. However, it then goes on to say that the Gulf is so stressed, so polluted, that the incremental damage from 10 more wells drilled would be just a drop in the bucket. And I actually don't think they say "drop in the bucket," but the message is clear.

RMS-5

No real-life, regional information from the Gulf and coastal areas is used in the decision. For example, baseline conditions in the Gulf are modeled. There is no on-the-ground data used in the EIS. For example, coastal residents believe that the Mississippi Sound is so polluted, they won't go in the water. Tourists who aren't familiar with the water quality will.

Earlier this year the entire Mississippi coastal beach was closed for over a month because of Red Tide. Extremely

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Restore Mississippi Sound (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

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RMS-5

unusual in -- in the cold months.

Oysters have practically disappeared from the Mississippi Coast, and shrimp and fish catches are falling. Over 50 dead baby dolphins have washed ashore this year alone. An article published in the last few weeks suggests that the cause of those dead dolphins was the oil spill. Tarballs have been seen regularly on Mississippi beaches, and studies show the deadly vibrio virus feeds on oil and can be found in very high concentrations in proximity to tarballs.

As very economist knows, the scarcer of the resource, the more valuable it becomes. The quality of water and the health of our ecosystems and aquatic life in our Gulf is poor and it's getting worse. To be accurate economically, the economic impact analysis should incorporate these conditions in its baseline and incremental analyses.

RMS-6

In addition, the EIS is required to address ecosystem services, which are the value to people of nature's benefits. Not taking into account how passionately people feel -- people on the coast feel about the

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Restore Mississippi Sound (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

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RMS-6

Gulf and its drilling resources, again, grossly understates the cost of drilling.

There are well-accepted, stated preference methods in the literature that would take that into account, but the preparers of the EIS chose not to use them. Instead using the habitat equivalency model, which does not address people's preferences. It's only based on restoration costs.

It's interesting that stated preference or contingent valuation models would not be utilized given that the economist Dr. Kenneth Arrow pioneered such models during Exxon Valdez oil spill and received the Nobel Prize in economics for doing so.

RMS-7

Finally, the decision to adopt the preferred approach, which is to lease sale 10 sites for oil and gas development, seems illogical. It is based on the finding that alternatives to drilling would end up costing much more in terms of environmental and social costs. This is a result of the assumption that if the sites were not drilled, the alternatives would be additional imports with spills from transporting that oil and

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Restore Mississippi Sound (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

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RMS-7

coal-fired and other electricity would need to be generated. These methods of providing energy are associated with a much higher costs than drilling for oil.

The environmental costs also do not accrue to the Gulf. They accrue elsewhere. I also have a problem with the assumption that the energy mix that they assume for the alternative no-sale, no-drill options would stay the same. So no additional reliance on renewables. They only -- they only assume 2 percent of energy consumption would come from renewables.

However, renewable sources of energy consumption have grown almost 50 percent from 2006 to 2015. And that's from 6 percent to 10 percent of the energy con -- of energy consumed. And it's projected to be 15 percent in 2022.

I believe that my findings, while brief, suggest that the alternative selected should be a no-drilling, no-leases, no-sales, no more oil in the Gulf of Mexico. Given the stress and the pollution levels and the effect on aquatic life, it just might be the tipping

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Sierra Club

Via Regulations.gov and Electronic Mail

June 6, 2016

Gary D. Goeke
Bureau of Ocean Energy Management, Gulf of Mexico OCS Region
Office of Environment (GM 623E)
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394
multisaleeis2017-2022@boem.gov

RE: DRAFT ENVIRONMENTAL IMPACT STATEMENT FOR OUTER CONTINENTAL SHELF OIL AND GAS LEASES IN THE GULF OF MEXICO FROM 2017-2022; DOCKET NO. BOEM-2016-0009

Dear Mr. Goeke:

The Sierra Club hereby submits the following comments to the Bureau of Ocean Energy Management ("BOEM") on the Draft Environmental Impacts Statement for the Gulf of Mexico Outer Continental Shelf Oil and Gas Leases: 2017-2022 (hereinafter "Draft EIS"). Under the Draft EIS, BOEM proposes 10 regionwide lease sales for the Gulf of Mexico, encompassing all unleased blocks in the Western, Central and part of the Eastern[1] Planning Areas, totaling close to 70 million acres.

The Sierra Club opposes new lease sales in the Gulf of Mexico. The problems and risks associated with oil and gas drilling have wreaked havoc on Gulf of Mexico ecosystems and the livelihoods of residents in the region. These adverse impacts outweigh the benefit of continued leasing and new drilling to the region and nation, particularly in a time when demand for climate change inducing fossil fuels is softening and the majority of existing offshore Gulf of Mexico leases remain undeveloped while existing onshore supplies are capable of meeting domestic consumption. New and expansive federal policies are further reducing our nation's dependence on oil forcing demand to decrease in the coming decades as vehicle technology improves and transitions away from fossil fuels. Simply put, the need for new leases and expanded oil and gas production activities in the Gulf of Mexico is non-existent.

Further, climate change disruption and the urgency to mitigate its impacts make rigorous cutbacks to fossil fuel consumption an imperative. The U.S. has been compelled into action by its recent signing of the Paris Agreement obliging the nation to make ambitious carbon reduction commitments to ensure that temperature warming does not exceed 1.5 to 2 degrees Celsius.

[1] Not subject to Congressional moratorium.

1

The DEIS also fails to adequately analyze the true impacts to and risks of ultra-deepwater drilling on the Gulf's sensitive and treasured ecosystems. Indeed, this is a crucial analysis given that industry is expanding its deep and ultra-deepwater drilling endeavors and that large swaths of the proposed lease areas have depths of over 10,000 feet.

The Draft EIS fails to consider these critical factors in managing Gulf of Mexico resources and determining whether to proceed with area-wide leasing of the Gulf's remaining unleased blocks. As explained below, BOEM must evaluate the impacts of the lease sales and its choice of alternatives, including a true "no action alternative," using accurate information about oil demand. In addition, BOEM must incorporate the lessons learned from catastrophic oil spills like the 2010 BP Deepwater Horizon oil spill disaster and conduct an analysis based on the wide range of significant impacts the Gulf has endured from the disaster and the thousands of other frequently occurring spills.

I. BOEM's Flawed Purpose and Need for the Proposed Action Makes Leasing the Gulf a Foregone Conclusion

NEPA regulations require that an EIS should "specify the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action."[2] The purpose and need inquiry is crucial for a sufficient environmental analysis because "[t]he stated goal of a project necessarily dictates the range of 'reasonable' alternatives."[3] Thus, "an agency cannot define its objectives in unreasonably narrow terms" without violating NEPA.[4] Further, the Outer Continental Shelf Lands Act ("OCSLA") mandates that BOEM balance offshore oil and gas development "with protection of the human, marine, and coastal environment," and that BOEM consider "national needs" in making decisions.[5]

BOEM's stated purpose for the Proposed Actions – "to offer for lease those areas that may contain economically recoverable oil and gas resources" – wholly ignores its statutory mandate and narrowly frames the statement to auction areas of the OCS that might contain recoverable oil and gas as the only means of meeting an alleged need.[6] Similarly, BOEM's stated need for the proposed actions "to further the orderly development of OCS resources in an environmentally and economically responsible manner ... to contribute[] to meeting domestic demand and enhances national economic security,"[7] violates BOEM's duties under NEPA and OCSLA. In particular, the need statement overlooks the realities of current and projected energy demand, fails to take a hard look at the state of existing leases, and appeases industry interests to expand drilling without adequately analyzing its impacts. *Id.* As described in detail below, BOEM's flawed assumptions about energy demand and contributions to our nation's

[2] 40 C.F.R. § 1502.13.
[3] *Carmel-by-the-Sea v. U.S. Dep't of Transp.* 123 F.3d 1142, 1155 (9th Cir. 1997).
[4] *Id.*
[5] 43 U.S.C. §§ 1802(2); 1332(3).
[6] Draft EIS at 1-5.
[7] *Id.*

energy supply narrow the purpose and need inquiry in such a way that makes leasing the remaining unleased blocks of the Gulf of Mexico – BOEM's preferred alternative – a foregone conclusion.

a. BOEM Uses Misinformation and Flawed Reasoning about Oil and Gas Markets to Justify Leasing the Gulf of Mexico

SC-1

BOEM must define the purpose and need for the proposed action based on an accurate picture of our nation's demand for and projected consumption of oil and gas in the decades to come. According to the EIA's energy outlook projections through 2040, crude oil consumption in the transportation sector will experience a gradual decline,[8] underscoring that the need for new leasing and production is largely absent. The widespread implementation of federal policies improving fuel economy throughout the transportation sector will further reduce overall domestic oil consumption.[9] Oddly, the DEIS makes the following contradiction without explanation: while "consumption of liquid fuels will decrease"... the nation will need to "rely on more oil" in the years to come.[10] BOEM cannot simply rely on these contradictory statements to justify further drilling development in the Gulf of Mexico.

Further, the DEIS significantly overstates the nation's consumption of natural gas. The DEIS states that U.S. consumption of natural gas in 2014 was 25.26 trillion cubic feet per day.[11] However, the DEIS conflates annual with daily consumption, resulting in an inflation of consumption by a factor of 365. According to the EIA, 2014 *annual* U.S. natural gas consumption totaled 26.70 tcf.[12] BOEM must rectify any conclusions it reaches about the purpose and need for the proposed lease sales if they are based on this inflated figure.

[8] EIA, Annual Energy Outlook 2015, *Transportation Sector Key Indicators and Delivered Energy Consumption*, available at http://www.eia.gov/forecasts/aeo/data/browser/#/?id=7-AEO2015&region=00&cases=ref2015&start=2012&end=2040&f=A&linechart=~~~~~~~~~~~~~~~~~~~~~~~ref2015-d021915a.56-7-AEO2015~ref2015-d021915a.57-7-AEO2015~ref2015-d021915a.58-7-AEO2015~ref2015-d021915a.59-7-AEO2015~ref2015-d021915a.60-7-AEO2015~ref2015-d021915a.61-7-AEO2015~ref2015-d021915a.62-7-AEO2015~ref2015-d021915a.63-7-AEO2015~ref2015-d021915a.64-7-AEO2015~ref2015-d021915a.65-7-AEO2015~ref2015-d021915a.66-7-AEO2015~ref2015-d021915a.67-7-AEO2015~ref2015-d021915a.68-7-AEO2015~ref2015-d021915a.69-7-AEO2015&ctype=linechart&sourcekey=0.
[9] 40 CFR §§ 85, 86, 600, 1036, 1037 (Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards for model years 2017 and beyond, combined with previous standards, will reduce oil consumption by 12 billion barrels. Phase 1 Fuel Efficiency and GHG Emission Standards for Medium and Heavy Duty Trucks for model years 2014 and beyond project reductions of 530 million barrels of oil. Proposed Phase 2 standards for medium and heavy duty vehicles for model years 2018 and beyond project an additional consumption reduction of 1.8 billion barrels.)
[10] Draft EIS at 1-5.
[11] *Id.*
[12] U.S. Energy Information Administration, *Natural Gas Consumption by End Use*, available at https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_nus_a.htm.

SC-1

BOEM's conclusion that continued leasing and development of the Gulf is necessary as a long-term, stable energy supply and to provide economic security is in error. BOEM reasons that the current glut in onshore natural gas production and higher pricing on the world market is pushing industry to export excess natural gas,[13] thus creating the need for additional offshore leasing. But, BOEM misses a critical point, evidenced by recent EIA and NERA studies, which is that as world demand and U.S. exports of natural gas increase, the accompanied increase in prices will cause U.S natural gas consumption to decline.[14] BOEM's reasoning omits the critical point that a reduction in U.S. consumption will result, thus minimizing the demand for additional natural gas supplies. Given the huge glut of natural gas supply serving the world market and domestic demand, these studies affirm the absence of additional demand for new offshore sources of oil and gas supply.

Moreover, the natural gas industry reports that the significant increase in unconventional natural gas production, due to technological advances such as horizontal and directional drilling and hydraulic fracturing, have led to a decrease in conventional production whereby conventional rigs such as those found in the offshore are mostly directed at oil drilling.[15] Unconventional onshore natural gas plays are expected to comprise more than 80% of the natural gas production in the US by 2040, whereas conventional offshore production will decrease to approximately 6% of total production.[16]

Further, the American Petroleum Industry report and the EIA and NERA studies all show that although demand for natural gas will gradually increase over the next two decades, overall domestic supply will surpass U.S. consumption and world market export demand combined. In addition, domestic supply will continue to respond to market fluctuations, and has the capacity to supply both world market export and domestic consumption demands even as they increase according to projections in the coming decades.[17]

In addition, the high rates of onshore natural gas well shut-ins provide further evidence of the diminishing need to develop new offshore leases in the Gulf of Mexico under increased natural gas demand conditions.[18] Because shut-in wells are readily capable of producing as market

[13] Draft EIS at 1-5 – 1-6.
[14] U.S. Energy Information Administration, *Effect of Increased Natural Gas Exports on Domestic Markets*, Jan. 2012, available at http://energy.gov/sites/prod/files/2013/04/f0/fe_eia_lng.pdf; NERA Economic Consulting, *Macroeconomic Impacts of LNG Exports from the United States*, Dec. 2012, available at http://energy.gov/sites/prod/files/2013/04/f0/nera_lng_report.pdf.
[15] American Petroleum Institute, *Understanding Natural Gas Markets*, 2014, available at http://www.api.org/~/media/files/oil-and-natural-gas/natural-gas-primer/understanding-natural-gas-markets-primer-high.pdf.
[16] *Id.* at 9.
[17] *Id.*
[18] Farmington Daily Times, *Shut-in Wells to Increase as Low Prices Linger*, May 28, 2016, available at http://www.daily-times.com/story/money/industries/oil-gas/2016/05/28/shut--wells-increase-low-prices-linger/84510614/.

SC-1

conditions become more favorable, the additional production capacity could fulfill demand in the unlikely scenario that there is a supply deficit.

BOEM also fails to acknowledge the sharp rise in exports of processed crude coming out of the Gulf Coast in recent years,[19] and the potential for increasing exports given the recent lifting of the federal export ban for domestically produced raw crudes. Within this new context, Gulf of Mexico production may not actually serve domestic consumption needs as the Draft EIS contends. Thus, BOEM's unsubstantiated conclusion that new Gulf of Mexico leases are necessary to ensure domestic energy supply and economic security requires further analysis.

b. Most of the Existing Leases in the Gulf of Mexico Remain Undeveloped

SC-2

BOEM also fails to evaluate the state of existing offshore Gulf leases. As of 2016, more than 22 million acres of the Gulf of Mexico have been leased to the oil and gas industry, with additional lease sales scheduled in 2016. However, approximately 80% of the leased acreage has not yet been developed while much of the producing areas will continue to produce for the foreseeable future. These facts coupled with the glut of onshore natural gas supply and the projected decline in oil consumption in the decades to come are sufficient to meet current energy needs for the 2017 to 2022 period and beyond, thereby refuting BOEM's alleged need to lease the remaining unleased blocks of the Gulf of Mexico.

The Draft EIS uses flawed reasoning and misinformation to erroneously narrow the purpose and need of the proposed action in order to justify leasing all remaining economically recoverable blocks of the Gulf. By asserting future energy demand is far greater than actual projections, BOEM has set itself up to select only one alternative and reject all other possible action alternatives in violation of NEPA and OCSLA.

II. BOEM Failed to Properly Consider a Reasonable Range of Alternatives

NEPA requires a "detailed statement" of "alternatives to the proposed action."[20] The purpose of this section is "to insist that no major federal project should be undertaken without intense consideration of other more ecologically sound courses of action, including shelving the entire project, or of accomplishing the same result by entirely different means."[21] The analysis of alternatives is the "heart of the environmental impact statement."[22] However, BOEM's Draft EIS fails to analyze a reasonable range of alternatives, and importantly, fails to properly consider the no-action alternative.

[19] Fuel Fix, *Gulf Coast Drives Surge in U.S. Exports of Petroleum Products*, Sept. 9 2014, available at http://fuelfix.com/blog/2014/09/09/gulf-coast-drives-surge-in-u-s-exports-of-petroleum-products/.
[20] 42 U.S.C. § 4332(2)(c).
[21] *Environmental Defense Fund v. Corps of Engineers*, 492 F.2d 1123, 1135 (5th Cir. 1974).
[22] 40 C.F.R. §1502.14.

Sierra Club (continued)

a. The Range of Alternatives Fails to Incorporate Additional Protections for Highly Sensitive Ecosystems and Habitat

SC-3

BOEM's range of alternatives lacks consideration of sensitive ecosystems and habitats encompassed in the proposed lease area including: designated critical habitat for the Northwest Atlantic loggerhead sea turtle distinct population segment;[23] sperm whale habitat in the Mississippi Canyon, Bryde's whales, sperm whale and other cetacean habitat in De Soto Canyon;[24] and habitat for ESA-listed corals found in the Gulf's Western and Central Planning Areas.[25] At a minimum, BOEM must consider alternatives that prohibit leasing and development in these highly sensitive areas, as well as consider an alternative that expands the exclusion zone for the Flower Garden Banks National Marine Sanctuary.

b. The DEIS Fails to Properly Consider a "No Action" Alternative

SC-4

BOEM fails to put forward a true no action alternative. Alternative E, which BOEM calls the "No Action" alternative, only would "cancel a single proposed lease sale" rather than all ten proposed leased sales that would occur under the proposed action in the 2017 to 2022 period.[26] Further, in rejecting the "No Action" alternative, BOEM assumes that the cancellation of any single proposed lease sale in the five year period is simply a postponement of that lease sale to a future lease sale and therefore any production activity and associated potential environmental impacts resulting from the cancelled lease sale would simply be deferred to a later date.[27] This reasoning disregards entirely the fact that any single lease sale or all ten proposed lease sales combined are not needed now or anytime in the future based on current and projected oil and gas market conditions described above. Indeed, market projections demonstrate that a true "no action" alternative that permanently cancels the proposed leases would in fact allow for continued production of oil and gas without obligating the U.S. to continue oil and gas development the Gulf of Mexico well past 2022.

Moreover, by framing the No Action Alternative as the cancellation (or postponement) of only a single lease sale rather than cancellation of the full swath of lease sales proposed for the five year period, BOEM ignores the full extent of damages that could be avoided by a true No Action Alternative. Indeed, no new leasing would reduce the potential for oil spills and other destructive impacts of oil and gas exploration and development; avoid the release of billions of tons of greenhouse gases and other pollutant discharges to the water and air; and avoid additional negative impacts to wildlife and local communities already impacted by the BP oil spill disaster and subsequent oil spills.

[23] 79 Fed. Reg. 39,855 (July 10, 2014).
[24] NRDC, *Petition to list the Gulf of Mexico Bryde's whale (Balaenoptera edeni) as endangered under the Endangered Species Act*, Sept. 2014, available at http://docs.nrdc.org/wildlife/files/wil_14091701a.pdf.
[25] Draft EIS at 4-168.
[26] *Id.* at 2-14.
[27] *Id.*

Sierra Club (continued)

SC-4

Without any analysis of the benefits to the marine, coastal and human environments of a permanent cancellation of the new leases, BOEM simply concludes that any adverse economic impacts to companies and federal government revenues of cancelling (or postponing) a single lease take precedent.[28] This conclusion plays into the longstanding culture of appeasing industry interests to maximize profits at all costs which has led to the disastrous consequences of rampant permitting and development of the offshore.

Further, the conclusion that cancellation of leases will adversely impact federal revenues fails to acknowledge the fact that even the industry's desire to invest in the Gulf is dwindling. The recent March 2016 lease auction garnered a total of only $156 million in bids, the fourth lowest total in the Gulf's Central District since 1983.[29] Notably, no bids were received for auctions blocks in the Eastern Planning Area.[30] BOEM's concerns about declining revenues fail to compare the benefits of a few hundred million dollars in revenues to the enormous costs associated with a single disastrous blow out or the thousands of frequently occurring oil spills. Indeed, the costs of clean-up and restoration, as well as costs to communities and the tourism industry of an oil spill disaster, on the order of billions of dollars, dwarf any benefits conferred by declining federal government revenues.[31]

At the very least, BOEM must consider and analyze a permanent no lease sale option. Given the current state of inactive existing offshore oil and gas leases, gas production nationally, and the ongoing and potential impacts of drilling activities, a true no action alternative that permanently cancels lease sales proposed for the 2017-2022 period balances oil and gas development with protection of the human, marine and coastal environments. In fact, it is the only possible option that comports with BOEM's mandate under OCSLA.

III. BOEM's Risk Analysis for Offshore Spills Does Not Adequately Consider the Inherent Dangers of Deepwater and Ultra-Deepwater Drilling

SC-5

In its risk analysis for offshore spills greater or equal to 1,000 barrels, BOEM calculated spill rates "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."[32] This analysis fails to take into account the risks inherent in deepwater drilling.[33] The lease sales at issue

[28] *Id.*
[29] Fuel Fix, *Winning Gulf Lease Sale Bids Total $156 million, 4th Lowest Since 1983*, Mar. 23, 2016, available at http://fuelfix.com/blog/2016/03/23/protesters-swarm-offshore-lease-sale-in-new-orleans/.
[30] Offshore Magazine, *Gulf of Mexico Lease Sale Yields $156 million in High Bids*, Mar. 23, 2016, available at http://www.offshore-mag.com/articles/2016/03/us-offshore-gulf-of-mexico-lease-sale-yields.html.
[31] Fuel Fix, *BP's Gulf Spill Toll Could Run up to $68.2 Billion*, June 23, 2015, available at http://fuelfix.com/blog/2015/06/23/bps-gulf-spill-toll-could-run-up-to-68-2-billion/.
[32] Draft EIS at 3-113.
[33] *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling, A Report to the President by the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling*, available at http://cybercemetery.unt.edu/archive/oilspill/20121211005728/http://www.oilspillcommission.gov/sites/default/files/documents/DEEPWATER_ReporttothePresident_FINAL.pdf.

SC-5

encompass high risk ultra-deepwater areas, close to 11,000 feet deep, and contain large areas of high risk formations many of which will produce high pressure/high temperature wells. The increased risk of spills and disasters associated with these high risk conditions must be part of BOEM's spill risk calculus.

Moreover, the Draft EIS bases its risk analysis of spills greater than 1,000 barrels on a report that uses spill data through 2010 which doesn't account for the recent expansion of ultra-deepwater drilling. Since 1992 when deepwater exploratory drilling began in earnest, a total of 244 wells have been drilled in ultra-deep waters. As of 2013, there were 136 ultra-deepwater wells in operation.[34] This number is a significant jump from 2009 when there were only 65 ultra-deepwater wells in operation.[35] The Draft EIS analysis of spill risk through 2010 omits potential significant increases in the risk of a spill, or even catastrophic spill, associated with the significant spike in ultra-deepwater drilling in recent years. This analysis must be corrected and considered when evaluating the risk of developing the unique deepwater areas encompassed within the proposed lease sale areas.

In addition, the industry has developed a "mechanical risk index" ("MRI") which calculates the complexities present in deepwater oil drilling in the Gulf of Mexico based on a number of factors and then rates the complexity of the well on a 1 to 5 scale with 5 being the most complex. Those factors include the water depth (ranging from >3,200 feet to >6,700 feet), well depth (ranging from >19,000 feet to >30,000 feet), the number of casings strings, and the percent population penetrating salt.[36] The Deepwater Horizon well represents a 3+ to 4 in these rankings. As of 2009, only 43 wells were drilled in the Gulf of Mexico with a complexity level of 3, 4, or 5 which would indicate that the actual likelihood of catastrophic failure for wells of this nature based on past oil spills could be as high as 1 in 43.[37] BOEM's risk analysis for high volume catastrophic events wholly ignores the unique characteristics of ultra-deepwater as a risk factor of drilling in the proposed lease sale areas. This must be corrected.

IV. BOEM Failed to Adequately Analyze the Impacts of a Catastrophic Spill

SC-6

As described in more detail below, the 2010 BP Deepwater Horizon disaster which spilled 206 million gallons of oil into the Gulf has had devastating impacts on Gulf of Mexico ecosystems, the livelihoods of Gulf communities, and the tourism industry. The Gulf has endured other catastrophic spills, including a 140 million gallon spill in 1979. In 2004, Hurricane Ivan struck a Taylor Energy offshore platform causing hundreds of gallons to leak into the Gulf for over a

[34] Breaking Energy, *Oil Companies Clamoring for Ultra-Deepwater Rigs*, Sept. 20, 2012, available at http://breakingenergy.com/2012/09/20/oil-companies-clamoring-for-ultra-deepwater-rigs/.
[35] *Id.*
[36] Pritchard and Lacy, *Deepwater Well Complexity – The New Domain*, Deepwater Horizon Study Group Working Paper, Jan. 2011, available at http://ccrm.berkeley.edu/pdfs_papers/DHSGWorkingPapersFeb16-2011/DeepwaterWellComplexity-TheNewDomain-DMP_DHSG-Jan2011.pdf.
[37] *Id.*

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decade; and, recent reports indicate a dramatic spike in the size of oil sheens in the vicinity and increased volumes of spilled oil in the past two years. Nearly 10,000 smaller spills have been reported between 2010 and 2015 in the Gulf of Mexico. In addition, numerous other catastrophic spills in other parts of the world have devastated marine ecosystems and the communities that depend upon them. The question is not if there will be a catastrophic spill event, it is when there is such an event what are the impacts and what are the response capabilities of the industry, government and other stakeholders.

Oil spills cause irreversible damage to marine and coastal environments, and the destructive impacts of large spills are immediate and severe. Oil spills and cleanup are also disruptive to ship traffic and detrimental to impacted shorelines, subsistence activities, commercial and recreational fishing, tourism, and the health of people living along the coast and people involved in clean-up efforts.

BOEM largely dismisses the impacts of a catastrophic oil spill concluding that such an event has a "low probability" of occurring and is "not reasonably foreseeable." Further, the Draft EIS oddly states that a catastrophic oil spill event is "not part of the proposed action."[38] Indeed, an unintended consequence with potential adverse impacts is never part of the proposed action, but it nevertheless must be evaluated as part of the NEPA process.

BOEM deflects all analysis of a catastrophic event by simply referencing the *Catastrophic Spill Event Analysis* white paper prepared after the Deepwater Horizon spill. Further, in the Proposed Five Year Plan document, BOEM largely dismisses the impacts of a catastrophic oil spill reasoning that oil and gas activities are regulated and changes have been implemented since Deepwater Horizon.[39] These assumptions are particularly troubling given that several recently published federal studies have found that necessary regulatory changes have in fact not yet been implemented, and the causes of the Deepwater Horizon oil spill still have not been fully addressed. Moreover, BOEM's sister agency, BSEE, "has not fully addressed deficiencies in its investigative, environmental compliance, and enforcement capabilities identified by investigations after the Deepwater Horizon incident,"[40] and accordingly, the agency is not able to effectively oversee offshore oil and gas development.[41]

BOEM's failure to adequately assess the true impacts of a catastrophic spill event within the Draft EIS is a violation of NEPA and must be corrected.

[38] Draft EIS at 2-22.
[39] See e.g. Proposed Five Year Plan at S-1.
[40] U.S. GAO, *Report: Interior's Bureau of Safety and Environmental Enforcement Restructuring Has Not Addressed Long-Standing Oversight Deficiencies*, Feb. 2016, *available at* http://www.gao.gov/assets/680/675099.pdf.
[41] *Id.* at 28.

Sierra Club (continued)

SC-7

V. BOEM Sets an Improper Baseline by Failing to Consider the Full Extent of Impacts Caused by the Deepwater Horizon Oil Spill Disaster

NEPA requires BOEM to "describe the environment of the areas to be affected or created by the alternatives under consideration."[42] Thus, the establishment of the baseline conditions of the affected environment is a fundamental requirement of the NEPA process. "Without establishing the baseline conditions which exist in the vicinity. . . there is simply no way to determine what effect the proposed [project] will have on the environment and, consequently, no way to comply with NEPA."[43]

BOEM lacks critical information regarding the effects of the Deepwater Horizon oil spill on the Gulf of Mexico. The Deepwater Horizon disaster resulted in the deaths of 11 workers and caused a spill of approximately 206 million gallons of oil over the course of at least 87 days. More than 1,000 miles of shoreline were contaminated with oil; 88,522 square miles of ocean—totaling one-third of the Gulf of Mexico—were closed to commercial and recreational fishing; millions of animals were killed or harmed; and local residents were sickened.

Six years later, the Gulf is still reeling from the effects of the spill. Recent studies demonstrate severe lung disease in dolphins; near-record lows of critically endangered Kemp's ridley sea turtle nesting; oil dispersants toxic to corals and jellyfish; and a "bathtub ring" of oil on the seafloor.[44] Another recent study published in April 2016 indicates that the spill impacted 19% more coastline that originally observed, finding that oil washed up on 1,313 miles of coastline along the Gulf of Mexico.[45] In addition, the 50,000 people involved in cleanup efforts suffer from an increased risk of physical and psychological injury.[46] Gulf residents are still suffering from increased symptoms of depression, anxiety, mental illness, and posttraumatic stress.[47]

However, the impacts of the spill are not yet fully understood and are still being studied. For example, the Natural Resource Damage Assessment, which assesses spill impacts to natural resources and informs future restoration is still underway. Moreover, BOEM has repeatedly admitted in other environmental review documents that there are data gaps regarding numerous resources in the Gulf of Mexico, including wetlands, coastal water quality, offshore water quality, air quality, commercial and recreational fishing and environmental justice, *and*

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[42] 40 C.F.R. § 1502.15.
[43] *Half Moon Bay Fisherman's Mark't Ass'n v. Carlucci*, 857 F.2d 505, 510 (9th Cir. 1988).
[44] Colegrove KM, Venn-Watson S, Litz J, Kinsel MJ et. al., *Fetal distress and in utero pneumonia in perinatal dolphins during the Northern Gulf of Mexico unusual mortality event*, Diseases of Aquatic Organisms 119, 1-16 (Apr. 12, 2016); Draft EIS at 4-24 (citing DeLeo et al., Response of deep-water corals to oil and chemical dispersant exposure, Deep-Sea Research II (2015)); Associated Press, *Officials Puzzled Over Drop in Kemp's Ridley Turtle Nests* (Aug. 12, 2013), available at http://www.kristv.com/news/officials-puzzled-over-drop-in-kemp-s-ridley-turtle-nests/#.
[45] Zachary Nixon, et al. *Shoreline oiling from the Deepwater Horizon oil spill. Marine Pollution Bulletin* (2016, in press).
[46] *See e.g.*, Oceana, *Time For Action Six Years After Deepwater Horizon*, Apr. 2016, available at http://usa.oceana.org/sites/default/files/deepwater_horizon_anniversary_report_updated_4-28.pdf.
[47] *Id.*

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that the impacts of the Deepwater Horizon oil spill on such resources may have changed baseline conditions.[48]

Further, BOEM has not yet completed its Section 7 consultation under the ESA following the Deepwater Horizon oil spill.[49] BOEM therefore does not have an accurate picture of the effects that authorizing more offshore oil and gas leasing and drilling (including in the very same area where the Deepwater Horizon spill occurred) could have on already imperiled species.

Accordingly, BOEM cannot properly define the environmental baseline, and BOEM cannot conduct a proper NEPA analysis unless and until these significant data gaps are filled. As such, any decision by BOEM to allow substantially more offshore oil and gas drilling is arbitrary and capricious.

VI. BOEM Failed to Take a Hard Look at the Direct, Indirect and Cumulative Impacts of Greenhouse Gas Emissions and Climate Change

While the DEIS acknowledges that offshore oil and gas activities result in the emissions of greenhouse gases,[50] BOEM wholly failed consider the impacts of refining, transporting, and consuming the oil and gas that could be developed under its leasing proposal. Moreover, while BOEM incorporates some analysis of climate change, that analysis is entirely cursory and fails to adequately describe baseline conditions or even acknowledge how climate change will impact oil and gas infrastructure in the Gulf. Such failures violate NEPA.

a. BOEM Failed to Consider Downstream Greenhouse Gas Emissions

SC-8

BOEM's Draft EIS fails to consider the greenhouse gas emissions that would be emitted by refining, transporting and burning the oil and gas to be extracted under its proposal. In evaluating the environmental impacts of the proposed action, NEPA requires BOEM to consider and describe the direct and indirect impacts.[51] These impacts are distinct from one another. Direct effects are "caused by the action and occur at the same time and place."[52] Indirect effects are caused by the action but, "are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems."[53] Downstream greenhouse gas emissions are precisely the kind of indirect effects that BOEM must consider in analyzing the impacts of its leasing proposal.

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[48] *See e.g.*, Draft SEIS on Lease Sale 247 in the Central Gulf of Mexico at 4-8; 4-13; 4-17; 4-25.
[49] *Id.* at 4-7 to 4-8.
[50] *See e.g.*, Draft EIS at 3-91.
[51] 40 C.F.R §§ 1502.16, 1508.7, 1508.8; *Northern Plains Resource Council v. Surface Transportation Board*, 668 F.3d 1067, 1072-73 (9th Cir. 2011).
[52] 40 C.F.R. § 1508.8(a).
[53] *Id.* § 1508.8(b).

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Indeed, guidance from the Council on Environmental Quality instructs agencies that "[e]missions from activities that have a reasonably close causal relationship to the federal action, such as those that may occur . . . as a consequence of the agency action (often referred to as downstream emissions) should be accounted for in the NEPA analysis."[54] As it described, "[f]or example, a particular NEPA analysis for a proposed open pit mine could include the reasonably foreseeable effects of various components of the mining process, such as . . . refining or processing the resource, and using the resource . . . as the direct and indirect effects of phases of a single proposed action."[55]

BOEM estimates that its proposal could result in the development and production of up to an estimated 9.5 billion barrels of oil equivalent.[56] It is possible even more oil will be developed given BOEM's estimates that put all undiscovered technically recoverable resources in the Gulf of Mexico at 73 billion barrels of oil equivalent.[57] Using EPA's carbon equivalent calculator, this means that BOEM's proposal could result in up to roughly 4.1 to 31.4 billion metric tons of greenhouse gas emissions from consumption of the oil.[58] But BOEM wholly failed to consider the impacts of these emissions or how allowing offshore oil and gas leases in federal waters will impact our ability to limit warming below 2 degrees Celsius consistent with goals of and obligations under the Paris Agreement.[59]

There is only a finite amount of carbon dioxide ("CO2") that can be released into the atmosphere without rendering the goal of meeting the 1.5°C (or even a 2°C) target virtually impossible. Unleased OCS areas alone would consume between 11.6% and 13.8% of that *global* budget.[60] Continued leasing of these fossil fuels is incompatible with any reasonable domestic

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[54] Council on Environmental Quality, *Revised Draft Guidance on Consideration of Greenhouse Gas Emissions and Climate Change in National Environmental Policy Act Evaluations*, Dec. 2014, at 11.
[55] *Id.* at 12
[56] Proposed Program at 5-10.
[57] BOEM, *Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf*, 2016, available at http://www.boem.gov/National-Assessment-2016/.
[58] U.S. Environmental Protection Agency, *GHG Equivalencies Calculator - Calculations and References*, available at https://www.epa.gov/energy/ghg-equivalencies-calculator-calculations-and-references.
[59] Climate change, driven primarily by the combustion of fossil fuels, poses a severe and immediate threat to the health, welfare, ecosystems, and economy of the United States and the world. In recognition of these threats, the Paris Agreement—adopted by 197 countries, including the United States, on December 12, 2015—codifies the international, scientific consensus that climate change is an "*urgent and potentially irreversible threat to human societies and the planet* and thus requires the widest possible cooperation by all countries." Paris Agreement, Decision, Art. 4(3). Accordingly, the Paris Agreement commits all signatories to an articulated target to hold the long-term global average temperature "to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C above pre-industrial levels." Immediate and aggressive greenhouse gas emissions reductions are necessary to keep warming below a 1.5° or 2°C rise above pre-industrial levels.
[60] *See, e.g.*, IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change at 64 & Table 2.2 [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)] at 18, 24-25 (offshore crude oil potential

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and international path to limiting warming to 1.5°C or even 2°C. Conversely, keeping fossil fuels in the ground by ending new offshore leases will help limit warming by reducing greenhouse gas emissions.

BOEM violates NEPA by ignoring the impacts of refining and consuming the oil and gas to be extracted under the proposal. This omission makes it impossible to know how BOEM's proposal can possibly be consistent with the Paris Agreement and efforts to limit warming to 1.5°C or even 2°C to avert the worst impacts of climate change.

b. BOEM Failed to Adequately Consider Climate Change Impacts on the Ocean and Coastal Environment

SC-9

In addition to failing to address the impacts of consuming the oil and gas extracted under its proposal, BOEM's environmental analysis fails to adequately consider the impacts of climate change on the ocean environment. While BOEM acknowledges that climate change is occurring, its analysis of the impacts of that change is cursory, fails to properly disclose the enormity of the problem, or the contribution of the proposed action to the problem.

For example, BOEM fails to adequately analyze the impacts of ocean acidification over the course of its proposal. The ocean's absorption of anthropogenic carbon dioxide is changing its chemistry, lowering its pH and causing ocean acidification.[61] Surface ocean pH has already dropped by about 0.1 pH units from 8.16 in 1800 to 8.05 today, resulting in a rise in surface ocean acidity of about 30 percent.[62] The pH of the ocean is changing rapidly at a rate 100 times anything seen in hundreds of millennia, and may drop by another 0.3 or 0.4 (resulting in a 100–150% increase in acidity) by the end of this century.[63] If carbon dioxide emissions continue unabated, resulting changes in ocean acidity could exceed anything experienced in the past 300 million years.[64]

Increased ocean acidification has significant adverse impacts on marine organisms. Among many other impacts, increased ocean acidity hinders species such as corals, crabs, seastars, sea urchins, and plankton from building the protective armor they need to survive.[65] Rising acidity

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emissions of 27.65-31.50 GtCO2e, offshore natural gas potential emissions of 24.07-30.05 GtCO2e). ("IPCC AR5 Synthesis Report").

[61] Feely, R. A., S. C. Doney, and S. R. Cooley, *Ocean acidification: present conditions and future changes in a high-CO$_2$ world*. Oceanography 22:36-47, 2009.
[62] Orr, J. C., et al., *Anthropogenic ocean acidification over the twenty-first century and its impact on calcifying organisms*. Nature 437:681-686, 2005.
[63] Meehl, G. A., et al., 2007: Global Climate Projections. in S. Solomon, D. Qin, M. Manning, Z. Chen, M. Marquis, K. B. Averyt, M. Tignor, and G. H. Miller, editors. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press, Cambridge University Press, Cambridge, UK, and New York, NY, USA.
[64] Caldeira, K., and M. E. Wickett. 2003. Anthropogenic carbon and ocean pH. Nature 425:365.
[65] Fabry, V. J., B. A. Seibel, R. A. Feely, and J. C. Orr. 2008. Impacts of ocean acidification on marine fauna and ecosystem processes. ICES Journal of Marine Sciences 65:414-432.

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also affects the basic functions of fish, squid, and invertebrates, impeding growth and increasing mortality.[66] Ocean acidification threatens to disrupt the entire marine food web.

BOEM also failed to consider how the increased frequency and severity of hurricanes and sea level rise will impact coastal areas and oil and gas infrastructure. Sea level rise is already increasing the risk of storm surge and flooding in coastal areas. Coastal communities are endangered by the potential for more intense hurricanes and weather events caused by human induced climate change.[67] The adverse impacts of sea level rise, including land loss, erosion, wetland submergence and habitat loss, directly threaten Gulf of Mexico's coastal states. Louisiana has lost more than one million acres of coastal wetlands over an 80 year period.[68] The Department of the Interior has stated that the industry could be responsible for as much as 56% of the loss.[69] And scientists say that at current rates, coastal erosion and sea level rise will lead to nearly all of southeast Louisiana to be under water by 2100.[70] Yet BOEM fails to adequately analyze these impacts or how its proposal will contribute to these problems.

Moreover, the DEIS violates NEPA because it fails to analyze how increased storm severity in the face of climate change will increase the risks of oil spills, accidents and other environmental harms associated with offshore oil and gas drilling and infrastructure[71] in the Gulf of Mexico.

VII. BOEM Cannot Escape Performing Site Specific Reviews by Claiming Analysis is Completed at the Post-Lease Stage When It Tiers Later Documents to the Lease Sale

SC-10

BOEM makes many decisions about the unique characteristics of deepwater drilling as well as other site specific decisions at the post lease stage. This includes reviews of oil spill response plans and exploration and development plans. The Draft EIS states that various mitigation stipulations may be required on a given lease but that Supplemental Environmental Impact Statements will not be prepared for individual lease sales,[72] thereby preventing the public from weighing in on the unique risks and areas of concern in a particular lease sale. This is especially troubling because BOEM's failure to consider the high-temperature/high pressure conditions

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[66] *Id.*

[67] 74 Fed. Reg. at 66,498; *see also* EPA, Climate Impacts in the Southeast, available at https://www3.epa.gov/climatechange/impacts/southeast.html; Carter, L. M., J. W. Jones, L. Berry, V. Burkett, J. F. Murley, J. Obeysekera, P. J. Schramm, and D. Wear, 2014: *Ch. 17: Southeast and the Caribbean. Climate Change Impacts in the United States: The Third National Climate Assessment*, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 396-417. doi:10.7930/J0N-P22CB.

[68] Draft EIS at 3-188; Nathaniel Rich, *The Most Ambitious Environmental Lawsuit Ever*, NY Times, Oct. 02, 2014, available at http://www.nytimes.com/interactive/2014/10/02/magazine/mag-oil-lawsuit.html?_r=0.

[69] *Id.*

[70] Bob Marshall, *The Lens*, ProPublica, Aug. 28, 2014, available at http://www.scientificamerican.com/article/losing-ground-southeast-louisiana-is-disappearing-quickly/.

[71] *See supra* at 8, Impacts of Hurricane Ivan on Taylor Energy offshore platform.

[72] Draft EIS at 1-9.

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and water depths in the Draft EIS risk assessment means that it makes critical decisions about the unique and high risk conditions of ultra-deepwater drilling at the post-lease stage without any public and essential stakeholder participation. As described in more detail below, BOEM's area-wide lease sale proposal encompasses a variety of diverse ecosystems and species habitat, as well as high risk landscapes that may require specialized protections and mitigation. Absent site specific impact analyses and mitigation determinations, certain regions may not be given the special protections they deserve.

The deferral of analysis is particularly troubling given that site specific analysis often does not occur in the post-lease process as the Draft EIS states. Instead, environmental assessments often tier back to the leasing analysis. BOEM cannot escape performing site specific analyses by claiming it is done at later post-lease stages when it claims in those stages that the analysis was done at the leasing sale. This approach violates BOEM's duties under OCSLA to comply with NEPA and the ESA at every stage of the offshore oil and gas authorization process and its duty to ensure offshore developments are balanced with environmental safeguards and protection of the human, marine and coastal environments.[73] Moreover, BOEM's approach also directly contradicts the National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling's ("Commission") express recommendation that BOEM conduct environmental review on a finer geographic scale.

BOEM's proposed area-wide lease sale approach in the DEIS makes post-lease analyses and decision making, and tiered assessments even more problematic. The area-wide lease sales combine 70 million acres from three separate planning areas – the Western Gulf, the Central Gulf and the Eastern Gulf – each with distinct ecological features. For example, the Western Region "hosts the northernmost tropical coral reef system in the United States at the Flower Garden Banks, an isolated system of predominately encrusting corals atop salt dome formations."[74] The system attracts reef fishes and large open-water species such as hammerhead and whale sharks.[75] The Western Region is also "home to some of the most important nesting sites for the endangered Kemp's ridley sea turtle."[76] The Central Region is home to a resident population of endangered sperm whales, and the Eastern Region includes manatee habitat.[77] The Louisiana coastline contains a variety of wetlands that make up one of the largest deltas in the world.[78] Moreover, the line between the Western and Central Regions and the Eastern Region follows the De Soto Canyon off the coast of Alabama and traces the eastern edge of the Loop Current, which effectively divides the Gulf.[79]

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[73] *See e.g.*, 43 U.S.C. § 1802(2); *Village of False Pass v. Clark*, 733 F.2d 605, 609 (9th Cir. 1984).

[74] *See e.g.*, Draft Proposed Program for 2017 to 2022 at 6-11.

[75] *Id.*

[76] *Id.* at 6-24.

[77] *Id.*

[78] Draft EIS at 3-188.

[79] *Id.*

SC-10

The Gulf's size and variation clearly require greater specificity in the size and location of lease sales. By combining these diverse regions into a single analysis, BOEM violates OCSLA's express requirement to prepare a leasing program that consists "of a schedule of proposed lease sales indicating, as precisely as possible, the size, timing, and location of leasing activity."[80] Further, this approach has been cited as particularly problematic by the Commission, which noted that the area-wide leasing approach favors industry at the cost of meaningful environmental analysis.[81]

Expressly contradicting the Commission's conclusions and directives, as well as statutory requirements, BOEM asserts that it is proposing an area-wide approach to provide greater flexibility to industry and balance agency workload.[82] BOEM does not have "carte blanche to wholly disregard a statutory requirement of convenience."[83] Nor can it abdicate its statutory duties under OCSLA or NEPA to appease industry. The designation lacks the precision required by statute and is therefore unlawful.[84]

VIII. BOEM has Created a Process Whereby the Public is Never Given a Meaningful Opportunity to Participate in the Review of Oil Spill Response Measures

SC-11

BOEM does not make Oil Spill Response Plans and the certification process open to public notice and comment. However, NEPA requires more: "The NEPA process has two purposes. First, '[i]t ensures that the agency, in reaching its decision, will have available, and will carefully consider, detailed information concerning significant environmental impacts.' Second, it 'guarantees that the relevant information will be made available to the larger audience that may also play a role in both the decision-making process and the implementation of that decision."[85] "The 'informational role' of an EIS is to 'giv[e] the public the assurance that the agency 'has indeed considered environmental concerns in its decision-making process,' and, perhaps more significantly, provides a springboard for public comment' in the agency decision-making process itself."[86]

[80] 43 U.S.C. § 1344(a) (requiring the Bureau to precisely define where lease sales occur); see also *Watt*, 668 F.2d at 1304(OCSLA "unambiguously directs the [Bureau] to specify the location of leasing activity 'as precisely as possible.'").
[81] National Commission on the BP Deepwater Horizon Oil Spill and Offshore Drilling, *Deep Water: The Gulf Oil Disaster and the Future of Offshore Drilling*, Jan. 2011, at 261, available at http://www.gpo.gov/fdsys/pkg/GPO-OILCOMMISSION/pdf/GPO-OILCOMMISSION.pdf.
[82] Draft EIS at 2-5.
[83] *Ctr. For Biological Diversity v. U.S. Dept. of the Interior*, 563 F.3d 466, 488 (D.C. Cir. 2009)
[84] *See Watt* 668 F.2d at 1304 (stating that while "a leasing program consisting of a schedule of proposed lease sales designated as merely ... 'Gulf of Mexico' ... may... place the entire nation on notice; they hardly satisfy the requirement that the location of leasing activity be specified 'as precisely as possible.'")
[85] *Quechan Indian Tribe of the Fort Yuma Indian Reservation v. U.S. Dept. of Interior*, 547 F.Supp.2d 1033, 1043 (D. Ariz., 2008) (citations omitted).
[86] *Id.*

Sierra Club (continued)

SC-11

In *Quechan*, the court found the NEPA process adequately fulfilled in the analysis of a land transfer for a refinery where the public would be given the opportunity to comment on later stages of construction of the refinery.[87] However, BOEM provides no avenue to fulfill the second purpose of NEPA—public participation—in regards to oil spill response plans ("OSRPs").

OSRPs provide the "mitigation" which BOEM uses to claim that the environmental risk of a blowout resulting in a large oil spill has been reduced to an insignificant level. The public cannot meaningfully participate in an environmental review of a lease sale where the basis for the minimization of risk associated with the activities that are reasonably foreseeable pursuant to that sale have not been exposed to public scrutiny and comment.

IX. BOEM Failed to Adequately Consider Environmental Justice Issues and Failed to Quantify the Social and Environmental Costs of its Proposal

SC-12

BOEM's proposal raises significant environmental justice issues. But BOEM fails to adequately address these significant impacts, or adequately analyze the social and environmental costs of continuing oil and gas development contemplated under the proposed lease sales.

As BOEM is well aware, on February 11, 1994, President Clinton issued Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations." The Executive Order makes it the responsibility of each federal agency to "make achieving environmental justice part of its mission in identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Accompanying this order was a Presidential Memorandum stating that "each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by [NEPA]."

States bordering the Gulf of Mexico are home to a variety of onshore oil and gas infrastructure that support offshore oil and gas drilling activities, including oil refineries. Toxic pollution from these refineries and petrochemical facilities disproportionately impact low-income neighborhoods and communities of color.

Moreover, many of these communities are at ground zero for the impacts of climate change, with sea level rise and wetlands loss already some of the earliest climate migration in the U.S. Scientists estimate that, if current rates of coastal wetlands loss and sea level rise continue, nearly all of southeast Louisiana will be under water by 2100, leading to the displacement of even more communities.

The proposed lease sales, or any option that supports the continuing sale of leases in federal waters, will exacerbate all these impacts by leading to more oil drilling, which will lead to more oil refining, toxic air pollution and greenhouse gas emissions. While BOEM quantifies the

[87] *Id.* at 1044.

Sierra Club (continued)

SC-12

purported economic benefits of its proposal, such as job creation and value added impacts, BOEM wholly fails to quantify the negative impacts that would result, such as the quantity of air pollutants from refining and consuming the oil and gas to be extracted and the attendant societal and environmental costs of such emissions. This is despite BOEM's prior quantification of harm caused by air emissions from oil and gas activities represented by dollars per ton for certain pollutants,[88] and a readily available tool to analyze the costs of the greenhouse gas emissions generated by BOEM's proposal—the social cost of carbon.

The social cost of carbon was developed by the Interagency Working Group on Social Cost of Carbon, which was convened by the Council of Economic Advisers and the Office of Management and Budget. As explained in the Working Group's (hereinafter Working Group) report:

> The purpose of the "social cost of carbon" (SCC) estimates presented here is to allow agencies to incorporate the social benefits of reducing carbon dioxide (CO_2) emissions into cost-benefit analyses of regulatory actions that impact cumulative global emissions. The SCC is an estimate of the monetized damages associated with an incremental increase in carbon emissions in a given year. It is intended to include (but is not limited to) changes in net agricultural productivity, human health, property damages from increased flood risk, and the value of ecosystem services due to climate change.[89]

The Working Group presents values for social costs from 2015 to 2050, ranging from $11 to $212 (in 2007 dollars per metric ton of CO_2).[90] The SCC demonstrates that the benefits of reducing carbon pollution are significant. However, recent studies have demonstrated that their numeric value assigned to the social cost of carbon vastly underestimates the true cost.[91]

[88] *See e.g.*, Draft Proposed Five Year Plan at B-8 (referencing OECM which quantifies the economic cost of air pollutants, including NOx, SOx, PM10 and PM2.5, carbon monoxide, and VOCs); Industrial Economics, Inc.; Applied Science Associates, Inc.; Northern Economics; and Dr. Nicholas Z. Muller. 2012. Forecasting Environmental and Social Externalities Associated with OCS Oil and Gas Development: The Revised Offshore Environmental Cost Model (OECM) (BOEM 2012-025).

[89] Interagency Working Group on Social Cost of Carbon, United States Government, Technical Support Document: *Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866*, May 2013, *available at* https://www.whitehouse.gov/sites/default/files/omb/inforeg/social_cost_of_carbon_for_ria_2013_update.pdf.

[90] Interagency Working Group on Social Cost of Carbon, United States Government, Technical Support Document: *Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866* at 2-3 (July 2015 revision), *available at* https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf.

[91] F. Ackerman & E. Stanton, *Climate Risks and Carbon Prices: Revising the Social Cost of Carbon, in Economics*, vol. 6 (Apr. 4, 2012) (the social cost of carbon could be almost $900/tCO2 in 2010, rising to $1,500/tCO2 in 2050).

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Sierra Club (continued)

SC-12

BOEM's analysis of the cumulative impacts of its proposal on environmental justice communities is inadequate. In particular, its failure to adequately describe and quantify these negative impacts does not comply with its duty to disclose environmental justice implications. BOEM's quantification of the purported economic benefits of its proposal while assigning zero value to the social and environmental costs is disingenuous and unlawful. Indeed, BOEM seems to dismiss the import of the additional air pollution that could result from its proposal on Gulf communities because there is already significant OCS-related infrastructure in the Gulf states. This approach undercuts the entire purpose of a cumulative impacts analysis and efforts to inform and engage environmental justice communities.

X. Conclusion

Sierra Club appreciates the opportunity to comment on the Draft EIS for Outer Continental Shelf Oil and Gas Leases in the Gulf of Mexico from 2017 – 2022. For the reasons stated above, BOEM must correct flaws in its analysis to accurately assess the risks and impacts of drilling in the sensitive ultra-deepwater ecosystems encompassed in the proposed lease sale areas. BOEM also must rectify the shortcomings of its assumptions and flawed information it relies on in establishing the purported need for the proposed action and to create a reasonable range of alternatives, including analysis of a true "no action" alternative that permanently cancels leases.

BOEM's statutory duty demands that it select an alternative that balances offshore oil and gas development with protection of the human, marine, and coastal environment. Given that oil and gas market projections demonstrate that new offshore sources of oil and gas production aren't needed, BOEM's preferred alternative, to lease all remaining unleased blocks of the Gulf of Mexico for long-term oil and gas production, violates NEPA and OCSLA.

Thank you for your consideration.

Respectfully,

Devorah Ancel
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Steps Coalition

U.S. Department of the Interior
Bureau of Ocean Energy Management

BOEM

Public Meetings for the
Draft Multisale Environmental Impact Statement
on Proposed OCS Oil and Gas Lease Sales in the Gulf of Mexico

COMMENT SHEET

Comments: **PLEASE PRINT**

STEPS-1

Thirty days to review over 700 pages of technical scientific information is not enough time to provide meaningful comments. Thus, I am requesting that the public comment period be extended at least 60 days.

Name: Jennifer Crosslin
Title: Community Organizer
Organization: Steps Coalition
Address: 610 Water St.
City, State, & Zip Code: Biloxi, MS 39530

Comments are not limited to the space on this sheet. Please feel free to add additional sheets if necessary.

Steps Coalition (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

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Comment by Jennifer Crosslin

JENNIFER CROSSLIN:

I'm a community organizer with Steps Coalition and a lifetime resident of the Mississippi Gulf Coast. My coalition is a local coalition of grassroots and community-based organizations that came together after Katrina to address the unjust recovery and to build a healthy, just, and equitable Mississippi Gulf Coast.

I am here today to stand with our coalition members and our Gulf Coast communities on the front line and fence line of the fossil fuel industry and climate change disasters.

For example, Barbara Weckesser, who couldn't physically be here today because she is not feeling well, like many other families living along the fence line of oil -- the oil and pet -- petrochemical industries, she and her neighbors are exposed to a number of toxic pollutants and carcinogens on a daily basis.

STEPS-2

The expansion of offshore drilling ensures that her communities and others like it in the Gulf will continue to be poisoned,

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Steps Coalition (continued)

STEPS-2

and it is an injustice not to take into account these communities in the EIS. It is also an injustice that your EIS calculates risk of drilling disaster by the number of spills and not also by the severity of the spill and -- by the severity of the spill and the negligent behavior -- the often negligent behavior of the oil and gas industry reporting and cleaning up spills.

Barbara, like many others living along the Mississippi Gulf Coast and across the region, has a son who has a number of health issues because he was exposed to the oil and chemicals used to clean up after the Deepwater Horizon drilling disaster. I personally have heard a number of stories -- many, many stories of people sick and dying because of the oil, chemical spill and the BP's negligent behavior in response to that spill.

Cleanup workers who were contracted are not protected and were told to not -- that they were not allowed to wear masks and -- or a risk of being fired. As a consequence, many of them, as I said, have been sick and dying and face a number of health issues that

Steps Coalition (continued)

severely threaten their livelihood and their lives -- the quality of their lives.

Offshore drilling is simply the messiest and the most dangerous form of oil extraction. Expanding offshore drilling just as the rest -- we -- this -- I'm sorry. This plan expands offshore drilling just as the rest of the world seeks to decrease its dependence on fossil fuels and would multiply the environmental injustices experienced by residents who live near the oil facilities and take a toll on our Gulf ecosystem that has still not recovered from BP Deepwater Horizon drilling disaster six years ago.

Mississippi should take advantage of emerging opportunities and renewable energy sector rather than doubling down on the dirty energy sources of the past. The oil and gas industry wants to paint us, those who support the no new leases and keep it in the ground campaigns, as extreme -- extremists, environmental activists to shift the focus away from the destructive and injustices the industries have imposed on our communities for decades.

Steps Coalition (continued)

But we are not extremists. We are people living on the coast who are concerned about the health of our families and the future of our planet. We are mothers, fathers, families and friends of those who have lost their lives and livelihoods as a result of this dangerous and unaccountable industry. We are people living in communities with refineries, storage facilities, toxic waste sites, pipelines, and oil trains in our backyards being poisoned daily by the toxic releases.

We are people living in the coastal communities that continue to be hit by climate disasters, super storms like Katrina and severe flooding recently in Gulfport and Biloxi and our friends in Houston. We are people living in areas where our land is sinking and our seas are rising because of extraction. We are people standing together to restore and protect an defend our Gulf.

The legacy of corruption and destruction of the fossil fuel industry cannot be ignored any longer. The future of our existence on this planet depends on it.

Steps Coalition (continued)

If we do not act now, the Gulf we call home will be under threat. We will see an increase in global temperatures that will result in the dramatic sea level rise that will bring Katrina-like funding -- flooding to coastal communities during high-tide events by the end of the century.

Also as a result of global temperature rises, we will see increased super storms, drought, dangerous fires, increased epidemics that threaten the lives of millions on this planet. We are already seeing a hundred thousand more asthma and heart-related deaths a year because of the climate change.

The rise in global temperatures will create chaos in climate that will disrupt our economy, strain our food and water supply. All of this will likely lead to the largest global migration in our history, increased famine, disease and violence. The level of despair and destruction that will ensue is frankly frightening. And as one scientist put it: If we do not act, the next century will be the century of hell on earth.

Our most socially economic and

Steps Coalition (continued)

physically vulnerable communities have already been impacted by the fossil fuel industry and will continue to be most adversely affected in the near future. But there will come a time when climate chaos will affect us all and threaten our very existence. We have a responsibility to our grandchildren and our great-grandchildren to ensure that this does not happen.

We can and must act. We must take seriously the threat that is on the horizon. No argument is good enough to delay action. Our future begins with the ending the expansion of the fossil fuel industry.

Let me be clear. We are ask -- I am asking and standing in solidarity with Gulf communities that I represent here today asking not to cease any and all extraction at this moment. We are asking to stop expanding and to start investing in renewables and to hire workers to repair the leaky pipelines and damaged infrastructure that the industry has taken responsibility for.

We are thrilled that the administration has taken the Atlantic out of the leasing

Steps Coalition (continued)

program, but the fact that the Gulf and the Arctic are still open for new business is an insult and, frankly, inconsistent with the President's commitment to global climate agreement to prevent catastrophic levels of climate change.

STEPS-3

By BOEM's own accounts the expansion will lead to 444 percent more greenhouse gas emissions than the level the U. S. committed to be -- committed to in order to prevent runaway climate change. Despite this, however, BOEM concludes no threats to climate change and minimizes the impact the industry currently has on the people living on the coast, ignoring the environmental and health impacts and the threats to other important industries such as fishing and tourism, reporting only the benefit of an anticipated increase in offshore drilling jobs created by the expansion.

STEPS-4

These jobs could easily also be created and likely in more numbers by expanding development in offshore wind, floating solar, tide and wave technology, and associated onshore development. We could, should, and

Steps Coalition (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

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STEPS-4

absolutely have to break free from fossil fuels by stopping the expansion of the oil and gas industry and investing in renewables.

The end of the fossil fuel industry is inevitable. But if we keep expanding out infrastructure in the Gulf while the rest of the country and the world are transitioning to renewables, we will be left out of the new green economy, and our already socially and economically vulnerable families and communities will suffer as a result.

The President has an obligation to listen and respond to all -- respond to the issues of all environmental justice communities in the Gulf and has committed to ensuring -- and make sure he -- I'm sorry -- and has committed to ensuring the future of our existence on this planet by reducing greenhouse gases. He must use his authority to put an end to the expansion of offshore drilling in the Gulf and the Arctic and put our Gulf on the path to being part of and benefit from the green economy and restore, protect, and defend our Gulf and our future.

Thank you.

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Chevron

Chevron

Paul Siegele
President and Chief Technology Officer

April 25, 2016

Mr. Gary D. Goeke
Chief, Environmental Assessment Section
Office of Environment (GM 623 E)
BOEM, Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

Dear Mr. Goeke,

Thank you for hosting the meeting in Houston on April 20, 2016, to solicit input to the draft Environmental Impact Statement (EIS) for the 2017-2022 leasing program. I note that the proposed program includes 10 potential lease sales in the Gulf of Mexico and 3 in Alaska, but excludes the Atlantic OCS.

US energy policy must include offshore resources to ensure access to affordable and reliable energy for the future. Energy development in the Gulf of Mexico is an important driver for US economic growth. In 2014, the industry provided 600,000 jobs, contributed over $60 billion in GDP, and provided $7 billion in federal revenues.

CHEVRON-1

I encourage the Interior Department to finalize a 2017-2022 offshore leasing program without excluding any further areas or imposing further restrictions. Proceeding otherwise would pose risks to the nation's economic and energy security. It would also reduce revenues to the US government and negatively affect the livelihoods and communities across the Gulf Coast.

Regards,

Paul Siegele

copy: Ed Spaulding - Chevron

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VIA E-MAIL: multisaleeis2017-2022@boem.gov

May 29, 2015

Attn: Mr. Gary D. Goeke
Chief, Environmental Assessment Section
Office of Environment (GM 623E)
Bureau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Blvd.
New Orleans, Louisiana 70123-2394

Subject: Comments on the Scope of the Gulf of Mexico Multisale Environmental Impact Statement for the 2017 – 2022 Five Year Outer Continental Shelf Oil & Gas Leasing Program.

ConocoPhillips Company (ConocoPhillips) is pleased to provide scoping comments on the Multisale Environmental Impact Statement (MSEIS) for Gulf of Mexico Lease Sales 249, 250, 251, 252, 253, 254, 256, 257, 259, and 261 (GOM Lease Sales) as provided in the Draft Proposed Program for the 2017 – 2022 Five Year Outer Continental Shelf (OCS) Oil & Gas Lease Program (5 Year Plan). The Bureau of Ocean Energy Management (BOEM) issued, on April 29, 2015, a Notice of Intent (NOI) to prepare a MSEIS wherein BOEM stated it seeks input on the scope of the MSEIS affecting the GOM Lease Sales.

ConocoPhillips has a strong, direct interest in the MSEIS and the GOM Lease Sales. As one of North America's leading energy producers, our primary strategic objectives include maintaining and sustainably growing oil and gas production in the United States. ConocoPhillips is a leading producer of natural gas in the United States and has major positions in most of the nation's leading producing basins with active exploration and development drilling programs. ConocoPhillips is known worldwide for technological expertise in deepwater exploration and production, reservoir management and exploitation and 3-D seismic technology. We hold and strive to maintain a safe operating record by emphasizing a strong culture of safety and environmental protection in our offshore exploration and development projects. ConocoPhillips is a major lease holder in the Gulf of Mexico, having exposed nearly $1 Billion in Gulf of Mexico Lease Sales since 2008, bringing revenue and other benefits to the United States. We continue to evaluate opportunities in the Gulf of Mexico and other areas of the OCS.

ConocoPhillips (continued)

ConocoPhillips recognizes that the purpose for this scoping period is for the BOEM, pursuant to the National Environmental Policy Act (NEPA), to collect and evaluate credible data from all interested parties in order to create a focused, justifiable MSEIS that is administered effectively for the GOM Lease Sales. The MSEIS must be structured to address the effects of the GOM Lease Sales by identifying and researching pertinent issues specific to the Gulf of Mexico. While considering these issues, alternatives should be formulated to mitigate known risks or adverse impacts, and all of these items should be communicated in the MSEIS with specifics as to the analytical tools utilized in the process. The Outer Continental Shelf Lands Act (OCSLA) calls for an appropriate balance of all factors for consideration when determining each Five Year OCS Oil & Gas Leasing Program and implementation including oil and gas exploration and production, environmental protection, and potential impacts to the coastal zone(s). These factors must be weighted fairly to construct the reasonable range of potential alternatives required in NEPA's analysis to any portion of the GOM Lease Sales and whatever mitigation is necessary to reduce or eliminate adverse effects. The reasonable range of alternatives must include opportunities that still permit oil and gas lease sales in addition to the "No Action" alternative.

CP-1

ConocoPhillips recommends that the BOEM apply the findings of its "Best Available Science" (BAS) analysis to operating scenarios that accurately reflect actual routine oil and gas activities. The BOEM should provide explicit documentation of what constitutes BAS, including the actual scientific experiments and practices currently in place, as well as how it was specifically applied to the MSEIS, including any rationale for its selection and use of BAS criteria. This can be achieved by the BOEM demonstrating its progression through the scientific method by clearly communicating its (i) foundation for and creation of hypotheses; (ii) experiments that test its hypotheses; (iii) detailed analysis and any conclusion(s) drawn. The experiments and analysis should be conducted using BAS strictly comprised of the most recently updated technology(ies) to monitor and assess realistic impacts of every day oil and gas activities. ConocoPhillips is concerned that the BAS that is utilized in the MSEIS process may not be applied in realistic settings consistent with standard oil and gas industry practices in use today or the foreseeable future. For example, in the 2014 Atlantic Programmatic Environmental Impact Statement, the BOEM purposely developed their study to be conservative by modeling its acoustic monitoring impact on marine mammal analysis at the highest sound levels and always at maximum power and operation. Further, the model estimated marine mammal population densities affected by the over-simulated acoustics were likely exceeding actual population densities. Essentially, the agency adopted a worst-case scenario with an extremely low probability of occurrence, an approach inconsistent with the objectives of the 5 Year Plan and its subsequent administration. ConocoPhillips strongly advocates an appropriate application of the BAS approach and encourages replication of BOEM's inclusion of new and updated science as found in recent offshore EIS documents, such as that utilized in the Chukchi Sea Environmental Studies Program for the Alaska OCS. ConocoPhillips is opposed to the BOEM utilizing mitigations resulting from (i) the use of dated technologies for new studies or the reapplication of findings from previous studies

ConocoPhillips (continued)

CP-1 that used out-of-date technology; and (ii) the use of any study outside the parameters of normal conditions where oil and gas activities are occurring.

CP-2 ConocoPhillips supports BOEM's intent to analyze all of the Gulf of Mexico regardless of certain areas being excluded for 5 Year Plan activity as provided in the DPP. It is important to assess all of the Gulf of Mexico in the MSEIS as currently excluded areas may potentially be available for activity in future Five Year OCS Oil and Gas Leasing Programs due to increased efforts to emphasize safety and environmental awareness leading to fewer incidents[1]. Since 2010, industry and federal government process improvements focusing on enhanced spill prevention and response have significantly strengthened the systems that ensure wells are drilled safely and with very little environmental impact.

CP-3 These efforts between the oil and gas industry and governmental agencies have built a stronger offshore safety culture. With increasing experience and strong processes in place, the nation stands to benefit tremendously from increased Gulf of Mexico exploration and development.

CP-4 In conclusion, ConocoPhillips calls for a fair and justifiable MSEIS to help administer the GOM Lease Sales so that BOEM maintains access and activity levels as provided in the DPP. All portions of the Gulf of Mexico that have been ruled inaccessible for this 5 Year Plan should be analyzed in accordance with NEPA's standards for potential environmental impact in order to provide reasonable foundation for consideration in future Five Year OCS Oil & Gas Leasing Programs.

ConocoPhillips appreciates the opportunity to provide scoping comments on the MSEIS and looks forward to working with BOEM as the agency continues to develop the 2017-2022 OCS Oil and Gas Leasing Program.

Sincerely,

Richard Lunam
VP E&P, North America Exploration

1 Source – BSEE 2014 Annual Report, May 1 2015

Spectrum Geo

PUBLIC SUBMISSION

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Docket: BOEM-2016-0009
The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0005
Comment from Eddie Pharr, NA

Submitter Information

Name: Eddie Pharr
Address:
11750 Katy Freeway
Houston, TX, 77079
Email: eddie.pharr@spectrumgeo.com
Organization: NA

General Comment

Ms. Kelly Hammerle May 19, 2016
Five Year Program
Bureau of Ocean Energy Management (HM-3120)
381 Eden Street
Herndon, VA 20170

Spectrum Geo (continued)

Dear Ms. Hammerle,
I am writing today to strongly urge that the Final Program maintain all Gulf and Alaska lease sales without any further restrictions. Our Country needs continued access to responsibly develop our offshore oil and natural gas resources for American energy security and economic prosperity. For this reason, I am extremely disappointed in the exclusion of the Atlantic lease sale. Spectrum Geo was the first company to file for an Atlantic seismic permit back in 2007. Since 2007, Spectrum has expended a tremendous amount of resources to obtain the Atlantic seismic permit. As a result of the exclusion of this area, Spectrum Geo is now reducing staff and redeploying capital to more competitive international opportunities.

SPECTRUM-1

In the Gulf of Mexico, we fully support maintaining all ten Gulf of Mexico lease sales without any further restrictions. The Gulf of Mexico produces roughly 15% of our America's domestic oil production and 5% of our domestic natural gas production. This prominent role in providing for American security and prosperity must be maintained. For decades in the Gulf of Mexico, energy development, conservation efforts, and other industries; be it tourism, commercial or recreational fishing, military training, or others have not only coexisted, but thrived alongside each other. The Department of Defense and the Interior have operated under a Memorandum of Agreement in the Gulf of Mexico for over thirty years, clearly outlining conflict resolution protocols. No justification exists for reducing either the number of Gulf lease sales or the proposed Gulf sale areas.
The proposed program unjustifiably eliminates the Atlantic lease sale scheduled for 2021. The Administration's justification for eliminating Atlantic leasing is based upon questionable claims.
Claim: potential conflicts with Department Of Defense and commercial interests.
o Reality: Department of Defense labelled only 5% of the proposed leasing area as in conflict; and potential conflicts are harmoniously and routinely resolved in the Gulf.
Claim: Unfavorable current market dynamics.
o Reality: Current market dynamics irrelevant when considering a lease sale five years in the future.
Claim: Limited support infrastructure.
o Reality: Ample port and related infrastructure currently exists and can be tailored and improved as future activity becomes more certain.

Spectrum Geo (continued)

5/20/2016 https://www.fdms.gov/fdms/getcontent?objectId=0900006481fe0630&format=xml&showorig=false

Claim: Opposition from many coastal communities
o Reality: Local coastal opposition amounted to roughly 4% of the total population of VA, NC, SC, GA; whereas the lease sale enjoyed bipartisan support from all four Governors, all eight U.S. Senators, a majority of all four Congressional delegations; and a majority of citizens in all four states.
Note other nations' aggressive programs to lease, explore and produce their Atlantic offshore areas; including neighbors Canada and Mexico; as well as Cuba and the Bahamas.
The proposed program continues to close over 85% of America's OCS to oil & gas activity. Opening these areas could provide substantial benefits to all Americans. A recent study shows that by opening the Atlantic, Pacific, and eastern Gulf of Mexico, America could by 2035:
o Create more than 838,000 jobs
o Spur nearly $450 billion in new private sector spending
o Contribute more than $550 billion to the US economy
o Generate more than $200 billion in new revenue for federal and state governments
o Add more than 3.5 million barrels of oil equivalent per day to domestic energy production, which are 2 times the amount produced in the Gulf of Mexico in 2014.

In conclusion, I am urging that the Final Program maintain all Gulf of Mexico and Alaska lease sales without further restriction. The removal of the Atlantic lease sale was truly disappointing and will dramatically impact our countries domestic energy production for decades to come. The oil and natural gas industry is a huge driver of our economy and is vital to our long term energy security.

Respectfully submitted,

Eddie Pharr
Spectrum Geo

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Andrea Alexander

PUBLIC SUBMISSION

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Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0011
Comment from Andrea Alexander, NA

Submitter Information

Name: Andrea Alexander
Address:

Email:
Phone:
Organization: NA

General Comment

AA-1 Natural resources like the Gulf of Mexico should NOT be bought and controlled by wealthy corporate interests, just like government officials should be public servants only and should NOT be bought and paid for by wealthy corporate interests.

Andrea Alexander (continued)

AA-1 The lands, waters, and wildlife of America really belong to us, the people -- if anyone-- but you corrupt government officials have robbed us of our heritage, just like you robbed the Native Americans not so long ago. You've handed our priceless forests, parks and refuges, wildlife, and marine resources over to ruthless, insatiable corporate entities who are ravaging, polluting, exhausting, and utterly ruining our beautiful planet -- all to satisfy their greed.

I've lived along the Gulf of Mexico my entire life, and I am absolutely disgusted by the recklessness of drilling and extraction companies. THey have decimated and destroyed so much marine life in the Gulf, from oysters and shellfish, to dolphins and whales, to pelicans and shorebirds, to turtles and so many other elements of the food web. They have decimated the seafood industry and injured the tourist industry along the Gulf Coast. They have decimated the habitat for so many creatures that call this area home and which are essential for our survival and our culture. They have no regard for all the people, wildlife, and natural resources they have displaced and ruined. And now, our government, once again, is willing to throw us to these wolves. Again.

Governments who hand over the lifeblood of the people (which the Gulf of Mexico is to us who live here) to these greedy uncaring companies (most of whom send their profits to foreign citizens and countries) are TRAITORS to their country and undeserving to be in power.

Shame on you government criminals. Traitors, every one of you who condone these companies that exploit what we have and give nothing back in return.

Charles Mackey Clark

U.S. Department of the Interior
Bureau of Ocean Energy Management

BOEM

Public Meetings for the
Draft Multisale Environmental Impact Statement
on Proposed OCS Oil and Gas Lease Sales in the Gulf of Mexico

COMMENT SHEET

Comments: PLEASE PRINT

CMC-1

Two blocks of Central Planning Area (CPA) closest to Horn Island are quite close to that barrier island – 3 miles or so. For this pristine island, that represents an environmental and aesthetic threat.

Name: Charles, Mackey Clark
Title:
Organization:
Address:
City, State, & Zip Code:

Comments are not limited to the space on this sheet. Please feel free to add additional sheets if necessary.

Jeff Cobb

6/1/2016 https://www.fdms.gov/fdms/getcontent?objectId=090000648...&format=xml&showorig=false

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Docket: BOEM-2016-0009
The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0008
Comment from Jeff Cobb, NA

Submitter Information

Name: Jeff Cobb
Address:

Email:
Organization: NA

General Comment

JC-1

No new oil leases. Humanity has already found 5 times more fossil fuel reserves than we can burn and stay under the 1.5 degrees Celsius temperature increase signed in the Paris agreement.

https://www.fdms.gov/fdms/getcontent?objectId=090000648...&format=xml&showorig=false 1/1

Suzanne Cohen

PUBLIC SUBMISSION

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Docket: BOEM-2016-0009
The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0022
Comment from Suzanne Cohen, NA

Submitter Information

Name: Suzanne Cohen
Address:

Email:
Phone:
Organization: NA

General Comment

COHEN-1

we can not protect our coast with all of the drilling that is going on now. Please help us protect our coast.

J Conn

PUBLIC SUBMISSION

As of: 4/26/16 7:43 AM
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Docket: BOEM-2016-0009
The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0001
Comment from J Conn, NA

Submitter Information

Name: J Conn
Address:

Email:
Organization: NA

General Comment

As a private citizen, I support Louisiana's oil and gas industry, which has supported tens of thousands of jobs in all 64 parishes and contributed almost $1.5 billion in states taxes in Fiscal Year 2013. The Gulf of Mexico provides 20 percent of the nation's crude oil supply, performing a vital service to meet the nation's energy needs, and providing jobs and economic opportunities for the American workforce.

J Conn (continued)

CONN-1 In Fiscal Year 2014 alone, Gulf of Mexico energy development supported 651,000 jobs, contributed over $64 billion in GDP, and provided over $7 billion in revenue to the federal government.Without Gulf of Mexico lease sales included in the 2017-2022 leasing program, the Interior Department estimates that the country would have to turn to imports to replace nearly 60 percent of the foregone production. I urge the Bureau of Ocean Energy m Management to maintain regionwide leasing in the Gulf of Mexico.

Community Advocate

PUBLIC SUBMISSION

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Docket: BOEM-2016-0009
The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0039
Comment from Community Advocate, NA

Submitter Information

Name: Community Advocate
Address:

Email:
Organization: NA

General Comment

CA-1 A review of the EIS indicates the failure in complying with the NEPA process, it does not present an analysis of the cumulative impacts of past, present and proposed leasing plan.

CA-2 BOEM staff admitted to gaps in the analytical process, which does not meet the minimum "Best Science/Best Practice for NEPA compliance.

Community Advocate (continued)

CA-3

I urge BOEM to adopt the no-action alternative for the entire Gulf of Mexico. Further, BOEM should end plans for new oil and gas leasing in the "ALL" federal waters of the US Outer Continental Shelf.

A full comprehensive EIS in compliance with NEPA should be completed before any new leases are offered. This process will protect our backyard, home. families and coastal communities which is a key part of BOEM's mission.

Katrina Dubytz

KATRIANA DUBYTZ: My name is Katriana Dubytz.

KD-1

All right. So, oil spills and air pollution from drilling and refining facilities make people very sick. There's a lot of reports out about various health issues that are caused by it.

And especially, they disproportionately harm low-income neighborhoods and communities of color, which is a huge issue for environmental justice. A lot of people don't realize that the people who are being affected are very, like -- sorry, they're like, essentially, like lower SES people who live not necessarily in the cities that are benefiting from the results of drilling and whatnot, but on the outskirts, who don't even benefit from the things that are harming them, whether it be in health or noise pollution, air pollution, whatnot. Or in this case, especially coastal areas that might be affected if there were an oil spill, fishing communities, whatnot; those areas that don't rely on more commercial things that might benefit from said practices.

KD-2

And then we have reviewed the environmental impact statement, everyone on our team at Rethink, and it really fails to address the impacts of downstream greenhouse gas emissions in downstream

Katrina Dubytz (continued)

KD-2

communities. So, again, people in the local area who would be seriously affected by these issues are not getting the appropriate attention that they should be in this impact analysis.

KD-3

And then we strongly believe that BOEM must develop a climate change ecological resilience and resistance plan to assess the full biological and ecological elements in the Gulf, and thus assist and manage the deeply important plants, animals and ecosystems as they adapt to climate change.

So not only the direct impacts that it might have, but as time passes, as climate change becomes a bigger issue, like assessing those needs as well. Especially in the 50-year plan.

So, those are mine. Thank you so much.

Testimony removed here to focus on the comment above. Please refer to the comment from the Leon Soil and Water Conservation District Supervisory Board (LSWCDSB) to see the removed testimony.

Susan Feathers

U.S. Department of the Interior
Bureau of Ocean Energy Management

BOEM

Public Meetings for the
Draft Multisale Environmental Impact Statement
on Proposed OCS Oil and Gas Lease Sales in the Gulf of Mexico

COMMENT SHEET

Comments: PLEASE PRINT

SF-1

I am impressed with the process BOEM has established to determine relative risk of oil & gas exploration to marine resources and ecosystems. The fact that B.O.E.M. is its own separate agency is a good thing to remove the influences of conflicting interests to protection of waters and wildlife and human communities.

SF-2

Concerns: the overall chart of potential impacts (EIS chart) shows mostly negligible to minor impacts to beneficial impacts. Is there undo influence from oil and gas industries (money, Congressional pressure) that influence outcomes (even if unwarranted)? Just a question that, as a citizen, I must ask.

SF-3

Finally, I wish there were NO MORE LEASE SALES, and an agency formed to transition to alternative, clean fuel or energy generation, at high speed. With the [CO_2] rising steadily, it seems risky to keep pursuing fossil fuels — sometime, we have to make the commitment to clean energy.

SF-4

Thanks for a great discussion, information, and a good diligence to inform the public. Well Done.

Name: Susan Feathers

Title:

Organization: 350 Pensacola

Address:

City, State, & Zip Code:

Comments are not limited to the space on this sheet. Please feel free to add additional sheets if necessary.

Yolanda Ferguson

Comment by Yolanda Ferguson

YOLANDA FERGUSON:

I have a few questions. I got on your website last night, and it was pretty good and I used it.

The Gulf of Mexico, its a resource and it's owned by everybody, is it not? And the American people, they keep -- you all keep it in trust for us.

YF-1

Well, there -- you know, there's been -- we wonder about all the leases that are out there that have been drilled and left. You know, just have already been lease, but are there waiting. Why do we need to get new leases if we have all these leases that aren't producing wells?

Can't there some way -- because the BP Oil spill was terrible. It -- it was awful. That way you all cleaned up that mess was absolutely atrocious.

YF-2

You know, do you charge every year for a fee for them to be out there for like -- for the wells that you have? You -- they've already bid on the wells and they won the leases. Do you all charge for the leases

Yolanda Ferguson (continued)

every year?

YF-3

The deepwater drilling, it -- it's been — we've had this before, and it was disastrous results. Have you all changed your itinerary on cleaning up? Because when you spill it -- when you drill it, you're going to spill it. Shell just spilled five times as much oil as they told us they spilled out there.

It came, they spilled 90,000 gallons. Well, come to find out, it's more closer to 500,000 gallons. Who is responsible to tell us really what's going on in our backyard?

You all sprayed toxic dispersant out there, and it messed up our ecology. It messed out ecosystem. It made my husband deathly sick. It attaches to everything. These toxic dispersants scare me. I don't want you all to get another Deepwater Horizon and you spay us again. Because we have people down here that are living with your long-term consequences.

Not you, in general, just -- you know, what I"m trying to say, sweetheart. Because who is responsible to us? You all make the

Yolanda Ferguson (continued)

decisions that affect us.

Our long-term consequences, we have no idea what's going to happen in the future. Our ecology's not coming back. Our Gulf is polluted. And as to restoring, forget it. They want to spend it on everything but fixing the mess that they created.

Somebody I feel owes us something. I mean, we live here. This is our backyard. Don't you think that we deserve an ecofriendly way to live?

If you had -- you know, I wonder how YF-4 many times -- I thought about this. I say, do you -- do they -- do they have a requirement where they go back and they have to recheck all these wells that they have leased over a certain amount of time? Your website said it's 10 years. Can you tell me if there is somebody that goes back out and rechecks all these leases? You all have got these little blocks to say where you leased them. Does anybody go out there and recheck these leases?

I mean, you -- you're giving all these leases off, leases like a piece of property and it sits there empty. Why do we need new

Yolanda Ferguson (continued)

YF-4 leases if you have all these already leased?

YF-5 It says -- it's like they like -- you wonder because if you're out there, do they have a contingency plan? We're -- you know, to clean this mess up. What's going to happen the next oil spill? That's my major concern. How are you going to clean this up? Where do we go to do the checks and balances to find out how you're going to go about what happens in the next spill?

We know you're not going to stop drilling. I know that. It's -- it's -- it's -- it's ill-feasible. I know it's not going to happen. I want -- I want -- but I want them to make a difference. I don't want to do another Deepwater Horizon. I mean, we can't do that. Our Gulf will be gone.

If you looked at pictures of what went on after the Deepwater Horizon, you -- to this day, calves aren't -- our dolphins aren't birthing calves. It -- they proved it's in the eggs as far away. The eggs come down here. They migrate. They take it back and when they hatch them out, it's in the eggs in Minnesota and other places.

Yolanda Ferguson (continued)

So they -- they don't even know how many animals came down and got sick and went somewhere else and died. This -- now, this scares me. That's why I want no new drilling. I want them to find an alternative to fixing safe practices. So whenever they do and then they drill and they spill, they're not making the rest of us sick.

Toxic dispersant is not the answer. Skimming, I don't know how that works. I've been told that that's what they did at the Shell. I was repeatedly told they didn't spray nothing this time. They just -- they just cleaned it up. And they said, well, the oil gets mixed in with water and makes goop.

YF-6

You all chose to drill in the -- in the water. They -- whoever does it. If they chose to drill, they have to chose a way to show us how they're not going to make us sick anymore. That's my major concern, how are you going to clean it up?

And where do we go to find out the answers to saying this to you? Because, you know, we didn't -- we want to know what they say after we say it. We have questions. We'd

Yolanda Ferguson (continued)

like some answers. So when will we -- where would we go to find out the information to know that we were hurt? Do you know that?

You shook you head?

THE REPORTER:

I'm the court reporter, so you'll have to speak next door.

YOLANDA FERGUSON:

Okay. That's what I wanted you to say.

THE REPORTER:

Okay.

YOLANDA FERGUSON:

But you're -- just because you're a court reporter, you're still sitting here and I deserve you be shown respect. Thank you for coming and doing this.

THE REPORTER:

Okay.

YOLANDA FERGUSON:

If you ever saw what happened -- we as a citizen of the Gulf Coast, the whole Gulf Coast -- Texas, Louisiana, Mississippi, Alabama, Florida -- we don't want this no more. I -- I never had any idea what went on when they drilled wells until they sprayed

Yolanda Ferguson (continued)

this stuff. Fisherman are dying. We have cancer rates that are going through the roof. And I like to have lost my husband.

Then I became -- I don't -- I don't -- I'm not an advocate -- I'm an advocate, not an activist. I'm an advocate to make sure that we don't do this again. That is my main concern: How are they going to clean this up when they spill it? Because if they're drilling it, they're spilling it, and I want to know how they're going to clean it up.

I guess I should ask them. But how are we -- when we say this, does this go back to Washington?

THE REPORTER:

Well, just off the record.

I'm with a private court reporting company.

YOLANDA FERGUSON:

Oh, okay. Okay.

THE REPORTER:

And so I prepare a little --

YOLANDA FERGUSON:

No wonder you looked like that.

I'm so sorry.

Yolanda Ferguson (continued)

THE REPORTER:

That's okay. I prepare a little transcript which I believe will be on their website --

YOLANDA FERGUSON:

Okay.

THE REPORTER:

-- so you can see your comments at some point in the future.

As far as your answers, that would be next door.

YOLANDA FERGUSON:

Okay, baby. I didn't know.

Okay. I just want to know -- I want to know how they're going to work --

(Off-the-record interruption)

YOLANDA FERGUSON:

I'm so sorry.

I just -- that -- that was my main concern. Because as citizens here, we don't want to do this again. I.

Know they're going to drill. I just want to know that they're not going to make the rest of us sick, because my husband was a marine worker. He did not go out on the

Yolanda Ferguson (continued)

BOEM PUBLIC MEETING - GULFPORT - MAY 19, 2016

water. The marine workers shouldn't have been made sick.

YF-7

You all -- they -- if they were going to -- I want to know who's in charge of the spill. I don't want the spiller in charge of the spill ever again. I don't want someone like BP to write a contingency plan that gives them the power to do what they did ever again. The spiller doesn't need control of the spill.

The people that are in charge of our government, the Coast Guard, NAS, whoever it is, they need to put somebody in charge so that they are representing the citizens of the United States of America, not some multinational corporation. That -- that's not okay.

So the spill to me is the issue here. What are you going to do? What's your contingency plan when we have another spill?

That was my major issue.

\- - -

Melissa Fleming

PUBLIC SUBMISSION

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Docket: BOEM-2016-0009
The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0019
Comment from melissa fleming, NA

Submitter Information

Name: melissa fleming
Address:

Email:
Phone:
Organization: NA

General Comment

MF-1

It is imperative that we protect frontline communities and marine wildlife from offshore drilling and halt all new oil and gas leases in the Gulf.

Leah Gentry

6/8/2016 https://www.fdms.gov/fdms/getcontent?objectId=0900006482017a29&format=xml&showorig=false

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The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0041
Comment from Leah Gentry, NA

Submitter Information

Name: Leah Gentry
Address:

Email:
Organization: NA

General Comment

LG-1

I ask you to grant no new oil or gas leases in the Gulf of Mexico. It has been proven over and over again that this is risky business for our environment, for sea life, for anyone who lives near a coastline, for the future well being of all living beings. Leave it in the ground. Resources would be far better used to enhance the development and use of alternative fuels. Please please take no action on new oil and gas

https://www.fdms.gov/fdms/getcontent?objectId=0900006482017a29&format=xml&showorig=false 1/2

Leah Gentry (continued)

6/8/2016 https://www.fdms.gov/fdms/getcontent?objectId=0900006482017a29&format=xml&showorig=false

LG-1

leases; not today, not ever. The Earth's future is hanging in a delicate balance; and part of that balance is held in your hands. Please, do the right thing and just say no.
Thank you.

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Jason Hannon

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The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0021
Comment from Jason Hannon, NA

Submitter Information

Name: Jason Hannon
Address:

Email:
Organization: NA

General Comment

JIII-1

The next 70 years??? We are beyond the "need" for fossil fuels. Anything oil can do, hemp can do better and sustainably! Which can also enrich the ecosystem, rather than pollute it further. Enough is enough, no more "Drill Baby, Drill!" As we sit on the precipice, we need to reach for the future, rather than dragging our feet in the past. Or you can continue to show us who bought and paid for you with these utterly

Jason Hannon (continued)

JIII-1

moronic decisions, and we'll gladly see you replaced by whatever means necessary.

Erica Heimberg

Multisale EIS 2017-2022, BOEM <multisaleeis2017-2022@boem.gov>

No New Oil and Gas Leases in the Gulf of Mexico

1 message

Erica Heimberg — Fri, Jun 3, 2016 at 3:09 PM
Reply-To:
To: multisaleeis2017-2022@boem.gov

EH-1

I am writing to demand a termination to all new oil and gas leases in federal waters in the Gulf of Mexico. The Bureau of Ocean Energy Management is considering lease options for five year beginning in 2017. This would allow drilling over the next 70 years putting wildlife and coastal communities at risk. Each time there is an oil spill thousands of endangered organisms are at risk as well as recreational and commercial fisheries.

For the past six years, the Gulf of Mexico has been on a recovery path from all of the damage sustained by the Deepwater Horizon disaster and has a long way to go to be as healthy as it once was. Any new drilling would lead to more offshore developments and accelerate the potential of spills and accidents. This is why it is prudent to close off any new drilling in the Gulf of Mexico.

Sincerely,

Erica Heimberg

Renate Heurich

Testimony removed here to focus on the comment below. Please refer to the comment from LAMOGA to see the removed testimony.

MS. RENATE HEURICH:

I'm a resident of New Orleans. I have been living here for the last 26 years. I went through Katrina, and I come here because I want to speak out against further leasing in the Gulf because I think the leases that we have are bad enough for the environment and for our climate.

Scientists are telling us -- I mean, basically all scientists tell us that we need to leave the vast majority of all known fossil fuel reserves in the ground if we want to achieve the goal of limiting global warming to 2 degree Celsius and we're past the point of 1 degree already and we know that temperatures are going to increase until they levee out. And basically we cannot afford to even look for more reserves when we know that the vast majority of the known reserves have to stay in the ground if we want to preserve a livable climate for our future and for our children.

RH-1

And President Obama, in Paris, agreed and signed the Accord where the goal is not just a limit of 2 degrees Celsius, but 1.5 if possible. In order to achieve that, we cannot drill for more oil or gas in the

Renate Heurich (continued)

RH-1

Gulf. It's just the opposite of what we should be doing. We should look for renewable sources of energy in the ocean. Other countries are able to do it; we should absolutely be able to do it to the Gulf.

There is the possibility to build wind turbines. Those devices get more and more efficient all of the time. They also get cheaper. We already have -- we could put cables through the pipelines that are running already from rigs onshore, so we could try to use the infrastructures already there.

RH-2

I'm also really concerned about the fact that a lot of those leases are in areas that are very deep. Half of it is as deep as the Deepwater Horizon or deeper, which means it's really risky to drill that deep.

RH-3

I feel even with the improved regulations, there is still a huge risk of extreme accidents, and we know the impact of the Deepwater Horizon spill are still around. I just -- I have tarballs here that I could show you that were just collected last month on Elmer's Island. They're all over the place. These tarballs, when you break them open, they contin flesh-eating bacteria, so we'll be fooling with dangerous stuff. And we don't even know, you know, what's still going on at the bottom of the

Renate Heurich (continued)

RH-3

Gulf because that's an area where it's hard to explore, but there are resources. There are large mats of oil and we -- I'm afraid to see how it is going to affect the environment and fisheries in the long-term.

RH-4

Plus, we always have leakage. I've seen so many pictures of leaks in the Gulf from oil production. Gas is leaking all of the time, and methane is a very powerful greenhouse gas. It's, in the shorter term, 80 times more powerful than CO2, so we absolutely need to curb that.

RH-5

One thing that the Environmental Impact Statement did not really look at is, I mean, they mentioned global warming and climate change, but they really did not put a cost, the real cost of climate change as compared to drilling for oil, on there. And this is going to be immense in terms of health impacts, but also catastrophic weather events, floods, droughts. It's going to affect the ability of people to live in cities where it gets hotter and hotter or to grow food when the land is drying up.

RH-6

We have other parts of the world, like the Arctic and the Middle East. The Arctic is heating up extremely fast with permafrost melting and increased sea level rise, which is especially a problem here for us in New Orleans. Sea level rise is going to continue

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Renate Heurich (continued)

BOEM MEETING — May 12, 2016, Page 8

RH-6

for hundreds of years scientists tell us. And it is -- we already see a lot of melting happening of glaciers in the Arctic.

Also, what -- so those are like huge impacts that are mentioned, but not really weighed. You know, the severity of it was not really evaluated sufficiently, I think.

RH-7

Also, the Environmental Impact Statement did not look at, okay, what do we do with the oil and the gas that we are producing, like, if it's going to be transported to refineries. We have people living near refineries and breathing in toxic air. We create toxic byproducts from refining oil. All of that has to go somewhere.

We have here in Louisiana the area called "Cancer Alley" with all of the petrochemical factories and refineries, and people are experiencing high levels of cancer and extremely rare cancers, but they can't go anywhere because their houses aren't worth much anymore. And these refineries disproportionally affect the franchise communities, people of color, lower income communities, which is also not right, and it's a big environmental justice issue. And BOEM should also look at long -- you know, not just at the oil that's being taken out, but also what do we do with that, and

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Renate Heurich (continued)

BOEM MEETING — May 12, 2016, Page 9

how does the product affect people.

So, yeah, I really want to encourage BOEM to look at renewable sources of energy in our oceans, wind, also waves, as we really should invest way more money into new technologies that are not a danger to our future and the future of our children.

RH-8

One concern, one thing that -- I also read that the studies that BOEM relied on, eight of the nine studies as far as the environmental impact is concerned were done by companies tied to the oil industry, and so what do you expect? It should be really independent studies, you know, not funded by the companies who obviously have their own interest.

Testimony removed here to focus on the comment above. Please refer to the comment from Sky Yardley to see the removed testimony.

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David Hilfiker

PUBLIC SUBMISSION

As of: 6/8/16 8:14 AM
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Docket: BOEM-2016-0009
The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0016
Comment from David Hilfiker, NA

Submitter Information

Name: David Hilfiker
Address:

Email:
Phone:
Organization: NA

General Comment

DH-1

Please remove all Arctic, Atlantic, and Gulf oil and gas leasing from the 2017-2022 Proposed Program.

Hilton Kelley

MR. KELLEY: My name is Hilton Kelley. That's H-I-L-T-O-N, Kelley, K-E-L-L-E-Y. And one of the reasons why I am here today is because I have some concerns with the contamination level in the Gulf of Mexico and the potential damage to our wetlands due to oil spills from oil rigs.

HK-1

One of the things that we would like to see as a total halt on oil drilling in the Gulf of Mexico due to the fact it's been overburdened already and there are more than 3,400 oil rigs out there already and some of them are abandoned and some of them are leaking.

HK-2

We have some concerns about land erosion due to oil coming into the wetlands, killing the vegetation, and also helping to erode the land due to the lack of vegetation holding up the land together. There's a serious erosion in sea-level rise in the wetlands as well.

HK-3

So, we think that the Gulf of Mexico needs an opportunity to heal itself and, also, to sort of replenish some of the wildlife that was there, maybe like 30, 40 years ago, before all the oil spills started happening along the Gulf.

HK-4

And, also, we want to reclaim our beaches. I remember as a kid growing up here in Southeast Texas walking on McFaddin Beach and one time I stepped in this

Hilton Kelley (continued)

HK-4

soft spot and it was just all gooey and all of a sudden, my leg just went all the way down in it up to the knee and it was nothing but tar and the sand had somewhat covered it over. I never went back to that beach and our beaches have, basically, been -- particularly McFaddin Beach -- have been destroyed because of the tar balls that wash up almost annually.

HK-5

So, we need to do more to help protect our Gulf. We need to do more to explore renewable energies in ways we could get off of fossil fuels and ways we can save our wildlife. Because as we know, a lot of birds each year get caught in some of the oil spills because they can't differentiate whether or not it's water or oil in the water when they land and they are being destroyed.

HK-6

There are a lot of negative things that are happening with all the oil drilling going on in the Gulf of Mexico and we think that we should get some reprieve from additional oil rigs being -- well, oil rigs out in the Gulf and the sale of the Gulf of Mexico.

So, that is my statement. I am against oil drilling in the Gulf of Mexico and we need to look at renewable alternatives.

****

Testimony removed here to focus on the comment above. Please refer to the comment from Consumer Energy Alliance to see the removed testimony.

Ronald Kardos

Comments on the draft 2017-2022 OGM Multisale EIS
Mr Gary D. Goeke
Chief, Environmental Assessment Section
Office of Environment (GM 623E)
Brueau of Ocean Energy Management
Gulf of Mexico OCS Region
1201 Elmwood Park Boulevard
New Orleans, Louisiana 70123-2394

I find it astounding that the Bureau of Ocean Energy Management U.S. Department of the Interior, Bureau of Ocean Energy Management would consider selling more off shore drilling rights in the upcoming 2017-2022 Gulf of Mexico OCS Oil and Gas Lease Sales.

RK-1

President Obama has concluded that we must move toward renewable energy sources and away from fossil fuel production and use.

The following is taken from the White House Website at:
https://www.whitehouse.gov/climate-change

CLIMATE CHANGE

AND PRESIDENT OBAMA'S ACTION PLAN

THE CLEAN POWER PLAN

The Clean Power Plan sets achievable standards to reduce carbon dioxide emissions by 32 percent from 2005 levels by 2030. By setting these goals and enabling states to create tailored plans to meet them, the Plan will:

PROTECT THE HEALTH OF AMERICAN FAMILIES. IN 2030, IT WILL:

- Prevent up to 3,600 premature deaths
- Prevent 1,700 non-fatal heart attacks
- Prevent 90,000 asthma attacks in children
- Prevent 300,000 missed workdays and schooldays

Ronald Kardos (continued)

SAVE THE AVERAGE AMERICAN FAMILY:

•Nearly $85 a year on their energy bills in 2030

•Save enough energy to power 30 million homes in 2030

•Save consumers $155 billion from 2020-2030

BOOST OUR ECONOMY BY:

•Leading to 30 percent more renewable energy generation in 2030

•Creating tens of thousands of jobs

•Continuing to lower the costs of renewable energy

With this in mind, it seems incredible that we would further jeopardize our oceans and subject the climate to more degradation due to the use of more fossil fuels.

RK-2
The potential for leaks is too risky and there is no adequate way to monitor for leaks in this environment. The damage done to the fragile ecosystem during construction and forever after is inestimable. Although the Flower Banks Marine Sanctuary will not be sold for the highest bidder, there is a potential for damage to it.
Here is just one example of the dangers of offshore drilling (a Taylor Energy Company owned platform that has been leaking since 2004).
http://www.nola.com/environment/index.ssf/2015/04/gulf_oil_spill_hidden_2004.html

RK-3
The U.S. Department of the Interior, Bureau of Ocean Energy Management should not consider the sale of more off shore drilling rights in the upcoming 2017-2022 Gulf of Mexico OCS Oil and Gas Lease Sales.

Ronald Kardos
and Marjorie Brigham-Kardos

John Kersting

6/6/2016 DEPARTMENT OF THE INTERIOR Mail - Stop Reckless Drilling Plans

BISON CONNECT

Multisale EIS 2017-2022, BOEM <multisaleeis2017-2022@boem.gov>

Stop Reckless Drilling Plans

1 message

John Kersting Sat, May 14, 2016 at 3:53 PM
To: multisaleeis2017-2022@boem.gov

As a Parent, Educated Environmentalist Family Member, Journalist, Teacher and Community Leader as Past Worthy President of the Olympia Fraternal Organization of Eagles with over 450 members, I have been working with many others on environmental issues for over 40 years while we have been promised by our government and Oil Companies they would stop the reckless use of risky drilling techniques in sensitive areas. Our people have long been demanding strong protections to our precious natural resources, jobs and food supplies.

We are furious our government's collusion with Oil's corporate bullying in the name of profits for those who deserve none for diminishing our wildlife, while poisoning our seas, air, food and lands. Using chemicals and releasing huge quantities of oil and byproducts causing great damage to our lands leading to documented catastrophic pollution problems while every one of us has these chemicals in our blood despite industry stalling of independent studies, I see nothing less than treason.

You must do all in your power to follow your primary mandate to protect us, not the profits of Oil's corporate or individual criminals, no matter if they have had laws passed to provide cover for their immoral acts. I know you have the mandate to protect us and you must.

JK-1
I'm writing to ask that all new offshore leases for drilling be removed from the 2017-2022 Outer Continental Shelf Oil and Gas Leasing Program and that you use your authority to permanently protect the Arctic and Atlantic from all new oil and gas leasing, forever. Like the Atlantic Ocean, the Arctic should not be opened for drilling, and instead of new lease sales in the Gulf of Mexico, we need a plan to transition communities to a clean, renewable energy economy.

Now more than ever, we are seeing the growing impacts of man-made climate disruption, fueled by our continued reliance on oil, gas, and coal. President Obama has a critical opportunity to extend his climate leadership into the next administration by using the upcoming OCS five-year plan to keep the fossil fuels off our nation's coasts in the ground where they belong. Our most vulnerable communities are at risk, both from rising sea levels and the very real dangers posed by offshore drilling.

JK-2
Exploration, drilling, and transportation raise the risks of catastrophic oil spills, and expose our air, water, and wildlife to significant amounts of pollution. There have been 40 large oil spills (greater than 42,000 gallons) since 1964, but smaller spills occur on a daily basis. In the past 45 years, BOEM estimates that more than 500,000 barrels of oil have leaked, unreported, into American waters.

JK-3
If the estimated oil and gas reserves on the Outer Continental Shelf are extracted and burned, more than 60 billion tons of carbon dioxide emissions would be released, negating the positive efforts by the Obama administration to lower emissions from coal plants and vehicles.

Thank you for removing the Atlantic coast from the 2017-2022 OCS Oil and Gas Leasing Program. Now I urge you to please take the next step to move America toward a clean energy future by removing the Arctic and Gulf from the five-year plan, and I urge the president to use his executive authority to permanently protect the Arctic and the Atlantic from all new oil and gas exploration, leasing, and drilling forever.

John Kersting

https://mail.google.com/mail/b/377/u/0/?ui=2&ik=5765db2e66&view=pt&search=inbox&th=154b10c172d0de5a&siml=154b10c172d0de5a 1/1

Brenna Landis

Comment by Brenna Landis

BRENNA LANDIS:

I'm just here today -- I -- born in Austin, Texas. Moved here when I was four years old. My mother's family has lived in Biloxi, Mississippi, for generations, and I'm just worried about new leasing in the Gulf of Mexico.

I recently graduated from the USM, Gulf Coast Campus, which is also right here in Long Beach, Mississippi, and I am concerned about the risk that would be inherent in allowing new drilling in the Gulf of Mexico, especially when we already have existing rigs. And I'm not saying to close down the existing rigs. I'm saying that we should not allow more drilling in the Gulf.

BL-1

We also have a dead zone that we know of from runoff from farms all along the Mississippi River that comes into our Gulf of Mexico. So any oil spill would exacerbate the effect of that dead zone on our marine life and plant life in the Gulf.

My aunt's family is a Biloxi fishing family, shrimping industry, and her -- you

Brenna Landis (continued)

know, her whole childhood is full of memories of working on shrimp boats in the Mississippi Sound and in the Gulf of Mexico. And this way of life is threatened by the risk of another oil spill.

And, yes, there have been new regulations put in place by the Obama administration for, you know, new leasing and reforms on how industry should regulate itself, but I think it's -- I don't think that it's wise to ignore the inherent risk that there is.

And also we have all this money from the BP settlement from the Deepwater Horizon disaster, and that money should be put into helping our existing economies and communities here along the Gulf Coast, Texas -- in Texas, Louisiana, Mississippi, Alabama, Florida, and go into creating an economy where we can switch from these oil and gas industry jobs to more renewable jobs.

And while I know that that would be a long transition, only -- that's only being realistic. I think as a citizen I have to make my voice heard and say that I am for no

Brenna Landis (continued)

new leasing whatsoever in the Gulf of Mexico.

My six-year-old daughter is outside. She didn't come in with me, but that's what I'm looking at is looking at the future. And I want her to be able to grow up and see the beauty that is our natural environment here on the Gulf Coast and not have that be risked for a resource that we know is not infinite and it's not renewable.

BL-2

And really we need to be looking at responsibly transitioning. Not right away cutting it off, because that's unrealistic, but a responsible transition to renewable energy.

So that's my comment.

- - -

Kellan Lyman

Testimony removed here to focus on the comment below. Please refer to the comment from Sky Yardley to see the removed testimony.

MS. KELLAN LYMAN:

KL-1

I believe the best interest of the people of the Gulf is to have no new leases for the oil and gas industry because the industry has demonstrated that they're unable to operate cleanly and has an unacceptable level of pollution, which damages Louisiana's natural heritage and livelihood. These impacts are detrimental to the ecosystem and economy.

The industry operates in a work culture characterized by discard for public and workers' safety and respect to the environment. Sometimes they report their violations. All too often, they do not.

Fly out over the Gulf and see or speak with the offshore rig workers living in Acadiana because industry has demonstrated they will not operate safely and choose profits over people.

I support Alternative E, no new leases

Kellan Lyman (continued)

BOEM MEETING

May 12, 2016
Page 11

for the Gulf.

(Meeting concludes at 4:00 p.m.)

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Michelle Macy

PUBLIC SUBMISSION

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The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0032
Comment from Michelle Macy, NA

Submitter Information

Name: Michelle Macy
Address:

Email:
Organization: NA

General Comment

MM-1

There should be NO more offshore drilling. I think the Valdez disaster and the BP fiasco should serve as somber reminders of why not.

Jane McBride

April 18, 2016

Dear BOEM,

JMB-1

Please end all new offshore oil and gas leasing in public waters.

JMB-2

Climate change is not a theoretical possibility in the future—it is happening now, and we must do all that we can to mitigate the disastrous consequences. Moreover, the United States should view climate change, not as a burden to our economy, but as an ECONOMIC OPPORTUNITY for the United States to regain its former position as a world leader in technology and innovation. No other country in the world is in denial about climate change science the way (half of) our country is, and the rest of the world is begging us to get serious about working with them to find solutions to prevent the worst scenarios from coming to fruition. Instead of drilling/fracking away at our limited oil and gas resources (which are finite anyway), we should be working to achieve energy independence through development of renewable, efficient, clean energy technologies that we can then SELL TO THE REST OF THE WORLD.

When we rely on imported oil, we are often supporting brutal authoritarian regimes that violate human rights and actively seek violence against us, leading us into everlasting warfare. When we produce our own oil and gas, we subject our environment and our citizens to spills, pollution, poisonous water, coastal erosion, fish kills and earthquakes. Many states in our country, such as Florida, have economies that rely on their precious natural resources like beautiful beaches and bountiful oceans. How is it good for our economy to destroy these pristine treasures by spilling oil all over them? Why not put oil and gas workers to work cleaning up the devastation that has been wrought on our environment by the oil and gas industry, while also employing them in building wind and solar farms and geothermal systems, upgrading and modernizing our infrastructure, and possibly building safe nuclear energy facilities? At the same time we could invest in our universities and entrepreneurs to invent new technologies and improve efficiency in existing ones, which will lead to great jobs and wealth creation. In short, we don't have to choose between protecting our environment and improving our economy—these goals are one and the same!

Fighting climate change must be a challenge that we embrace as a people, not hide from until it bites us in the ass.

Sincerely,

Jane K McBride

Bruce Melton

6/8/2016 https://www.fdms.gov/fdms/getcontent?objectId=[illegible]&format=xml&showorig=false

PUBLIC SUBMISSION

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Docket: BOEM-2016-0009
The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0015
Comment from Bruce Melton, Climate Change Now Initiative 501c3

Submitter Information

Name: Bruce Melton
Address:

Email:
Phone:
Organization: Climate Change Now Initiative 501c3

General Comment

BM-1

There is an alternative missing. The concept is a carbon neutral fossil fuel extraction alternative. Direct air capture of carbon dioxide is $10 per ton using waste heat with Global Thermostat's new industrial scale pilot process. Captured CO_2 can be re-injected into fractured oil shale and sequestered in far greater quantities than previously assumed, while enhancing formation production (which will also need to be carbon neutral production as well creating a somewhat endless loop.) Tao and Clarens estimate the Marcellus Shale alone can hold 10 to 18 Gigatons of CO_2 through 2030, or half the CO_2 emissions from all US stationary sources during this period.

Tao and Clarens, Tao and Clarens, Estimating the Carbon Sequestration Capacity of Shale Formations, American Chemical Society, August 29, 2013 pdf
http://pubs.acs.org/doi/abs/10.1021/es401221j?utm_content=buffer6c08a&utm_source=buffer&utm_medium=twitter&utm_campaign=Buffe

https://www.fdms.gov/fdms/getcontent?objectId=[illegible]&format=xml&showorig=false 1/1

Harriett Myers

U.S. Department of the Interior
Bureau of Ocean Energy Management

BOEM

Public Meetings for the
Draft Multisale Environmental Impact Statement
on Proposed OCS Oil and Gas Lease Sales in the Gulf of Mexico

COMMENT SHEET

Comments: **PLEASE PRINT**

HM-1 I believe there is no way to 100% prevent fires, spills or collapses; and I believe the nature of business is to take risks. Also, I believe current regulations are weak.

HM-2 We need to be reducing our use of oil rather than drill in unsafe places. Due to climate change we also need to reduce use of oil.

HM-3 Oil disasters affect the lives of sealife; the availability of seafood for the seafood industry, & for my table are affected. Tourist industries are also affected.

HM-4 The coast is not immune to damages. Spills harm sea birds and coastal bird, coastal plants including habitat ~~for~~ spawning, beaches for the pleasure of citizens & tourists.

Name: Harriett E Myers
Title:
Organization:
Address:
City, State, & Zip Code:

Comments are not limited to the space on this sheet. Please feel free to add additional sheets if necessary.

James Mulcare

6/8/2016 DEPARTMENT OF THE INTERIOR Mail - No New Oil and Gas Leases in the Gulf of Mexico

BISON CONNECT

Multisale EIS 2017-2022, BOEM <multisaleeis2017-2022@boem.gov>

No New Oil and Gas Leases in the Gulf of Mexico
1 message

James Mulcare Mon, Jun 6, 2016 at 3:31 PM
Reply-To:
To: multisaleeis2017-2022@boem.gov

JM-1 I am writing to demand a termination to all new oil and gas leases in federal waters in the Gulf of Mexico. The Bureau of Ocean Energy Management is considering lease options for five year beginning in 2017. This would allow drilling over the next 70 years putting wildlife and coastal communities at risk. Each time there is an oil spill thousands of endangered organisms are at risk as well as recreational and commercial fisheries.

For the past six years, the Gulf of Mexico has been on a recovery path from all of the damage sustained by the Deepwater Horizon disaster and has a long way to go to be as healthy as it once was. Any new drilling would lead to more offshore developments and accelerate the potential of spills and accidents. This is why it is prudent to close off any new drilling in the Gulf of Mexico.

Sincerely,

James Mulcare

https://mail.google.com/mail/b/377/u/0/?ui=2&ik=5765db2e66&view=pt&search=inbox&th=155278a52f62b02a&siml=155278a52f62b02a 1/1

Joanna Nasar

Multisale EIS 2017-2022, BOEM <multisaleeis2017-2022@boem.gov>

No New Oil and Gas Leases in the Gulf of Mexico
1 message

Joanna Nasar Fri, Jun 3, 2016 at 3:24 PM
Reply-To:
To: multisaleeis2017-2022@boem.gov

JN-1

I am writing to demand a termination to all new oil and gas leases in federal waters in the Gulf of Mexico. The Bureau of Ocean Energy Management is considering lease options for five year beginning in 2017. This would allow drilling over the next 70 years putting wildlife and coastal communities at risk. Each time there is an oil spill thousands of endangered organisms are at risk as well as recreational and commercial fisheries.

For the past six years, the Gulf of Mexico has been on a recovery path from all of the damage sustained by the Deepwater Horizon disaster and has a long way to go to be as healthy as it once was. Any new drilling would lead to more offshore developments and accelerate the potential of spills and accidents. This is why it is prudent to close off any new drilling in the Gulf of Mexico.

Sincerely,

Joanna Nasar

Rebecca Parsons

PUBLIC SUBMISSION

As of: 6/8/16 8:20 AM
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Docket: BOEM-2016-0009
The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0027
Comment from Rebecca Parsons, NA

Submitter Information

Name: Rebecca Parsons
Address:

Email:
Organization: NA

General Comment

Dear Bureau of Ocean Energy Management,

I live in the Big-Bend panhandle of Florida and have seen and experienced first-hand the devastation of the BP Gulf Oil Spill. And now we've experienced a second bad spill, this time from Shell.

Rebecca Parsons (continued)

I have learned that you have a proposal to lease almost 80 million acres of the Gulf of Mexico that will put us on a dangerous path for more destruction for generations. There will be more oil spills, air pollution, destroyed marine and wildlife, destroyed fishing and tourism economy.

Even more important is our longer term future. Surely you know that renewable energy is integral to our ability to survive as humans as the planet continues to warm at dangerous levels. Surely you know that each of the last several years have had record breaking levels of high temperatures.

RP-1

Your proposal will undermine the Paris Agreement to limit global warming to 2 degrees C.

Your proposal will undermine President Obama's commitment to take action on climate change.

Your proposal will undermine the sentiments of the vast majority of the American people who believe major changes in energy production are necessary to protect the earth - and our species' survival - as populations continue to increase.

RP-2

It is stunning that your intent is to promote the "same old" methods of energy production, when everything points to the disasters that will cause. Renewable energy innovation and production are proceeding at a fast rate - your efforts will be better spent in supporting and increasing renewables. Issue offshore wind farm leases instead. The dirty Industrial Age is over.

RP-3

I strongly urge you to stop all new oil and gas leases, and carry out the will of the President and the American people.

Jack Radosta

U.S. Department of the Interior
Bureau of Ocean Energy Management

BOEM

Public Meetings for the
Draft Multisale Environmental Impact Statement
on Proposed OCS Oil and Gas Lease Sales in the Gulf of Mexico

COMMENT SHEET

Comments: **PLEASE PRINT**

AS A NATIVE LOUISIANAN I WAS HORRIFIED TO SEE X ~~#~~ OF BARRELS OF OIL. POURING INTO MY GULF COAST REGION. I REALIZE THAT WE WILL NOT ACHIEVE ~~FOSSIL FUEL~~ ~~FOSSIL F~~ FREEDOM FROM FOSSIL FUEL ADDICTION ANY TIME SOON.

WE COULD HAVE BUT FOR THE FACT THAT OUR FEDERAL, STATE, AND LOCAL RULERS ARE BOUGHT BY THE OIL ENERGY COMPANIES.

AND UNTIL WE THE PEOPLE STOP ELECTING THESE PROSTITUTES NOTHING WILL CHANGE.

JR-1

I IMPLORE THE POWER THAT BE TO PUT A MORATORIUM ON ALL DRILLING UNLESS IT IS 100% FAILSAFE.

DO THE RIGHT THING

Name: JACK RADOSTA

Title:

Organization: LA. BUCKET BRIGADE, COALITION to RESTORE COASTAL LA CRCL

Address:

City, State, & Zip Code:

Comments are not limited to the space on this sheet. Please feel free to add additional sheets if necessary.

Maxine Ramsay

Comment by Maxine Ramsay

MAXINE RAMSAY:

I live north of Ocean Springs, and I am a retired Department of Interior employee.

MR-1

In this here problem -- and we see it as a problem -- why should we believe any gas or oil drilling in the Gulf will be safe? In softball and baseball I learned at an early age three strikes, you're out. This oil and gas drilling has had more than three strikes.

But in recent years Taylor Energy Oil has been leaking for years. In fact, since 2004, if my memory is correct. And, of course, they blame it as an act of God.

The BP oil spill in 2010 was devastating. Not only was it devastating to the seafood industry and to the -- all the effects of the environment, but ask the 11 families that lost their loved ones how devastating it was.

Now Shell Oil has a large spill out in the Gulf.

That's three strikes, you're out.

Again, why should we believe any gas or oil drilling in the oil will be safe?

Cyrus Reed

Testimony removed here to focus on the comment below. Please refer to the comment from Consumer Energy Alliance to see the removed testimony.

****

MR. REED: My name is Cyrus Reed; and I am commenting on the Gulf of Mexico Oil and Gas Lease Sale 2017 to 2022.

CR-1

So, these are just some observations I am going to make -- and I will do written comments -- but No. 1 is: I feel like one of the alternatives that they didn't look at that they could have is the potential of the ocean's for alternative energy. And what I mean by that is, this is an EIS about oil and gas leasing, but there is tremendous potential for offshore wind, we know from the studies that have been done in Texas. So, they could consider an alternative of having a zone set aside for offshore wind. There's other alternatives, like wave technology and title technologies, that they could look at because to me, that -- if you are going to do a true EIS, you need to look at all the alternatives, not just the oil and gas leasing. So, I would like them to

Cyrus Reed (continued)

CR-1

consider that in the EIS as an alternative, either in lieu of offshore oil and gas leasing or at least as a part of it, you know, creating a -- say a 50-mile zone in the regions where there is sufficient wind to do that, I think would make a lot of sense because I think that's the way the world is going and I think we are going to eventually electrify our grid and we are not going to rely on oil and gas so much. You know, we will for a while, but not as much as we do today. So, I would like them to do that.

CR-2

I am also -- you know, I have gained an understanding that it's in the programatic EIS where they do all the climate change analysis. That being said, I feel like this EIS should at least acknowledge that, you know, climate change is real and that further oil and gas leasing and oil and gas drilling will lead to more, not less, impacts on climate change and I feel like it should be addressed in the EIS, and it would be a reason to say we -- you know, alternatively we don't want to do more oil and gas drilling because of those issues.

CR-3

I recognize that the EIS does talk about the role of tourism, fishing, and other recreational uses of the ocean, but I am not sure it's fully valued in the way that it should be, again, as an alternative kind of use of the ocean, along with oil and gas leasing.

Cyrus Reed (continued)

CR-4

I do recognize that Alternative D seems to open up the potential to protect the areas with topographic special features. I am not a, you know, biologist. So, I am going off memory here. But topographic, I guess, high features in the ocean floor. And, so, I would absolutely -- if oil and gas drilling is going to be done, all of those areas -- and you know I've got a list of them that I copied from the East Flower Garden Bank, West Flower Garden Bank, Horseshoe Bank. There's, you know, 30 or so of them, and I won't read them all, but, yeah, I do believe, at the very least, should be protected because we know from the BP Deep Horizon Diaster, you know, what can happen when there are oil and gas released and how that can impact these places. So, keeping drilling out of those areas would be very important.

I do --

Is there a limit? Can I keep going on?

BOEM REPRESENTATIVE: You can keep going.

CR-5

MR. REED: I do -- I'm not sure that this EIS really looks precisely at the downstream impacts of oil and gas leasing and -- I mean that both for Greenhouse gas emissions, which I know is supposedly covered in the other EIS, but also for just other air emissions. So, if you drill oil and gas, you are going

Cyrus Reed (continued)

CR-5

to have to either pipe it or ship it and it's probably coming here to Beaumont or Port Arthur or Louisiana to be refined and there are going to be impacts and those should be -- I guess my argument is: We shouldn't just look at the oil and gas drilling and its era impacts right there at the drill rig but also downstream, you know, where it's actually refined. So, I feel like that should be covered in this area.

And, again, I will do written comments with a lot of details. I am just trying to hit some...

CR-6

I do wonder if they have really analyzed -- you know, we have seen the climate change, we've seen -- not that there haven't been hurricanes always, but we've seen more intense hurricanes recently. So, I wonder if they have really examined the fact that if it's true that those storms are happening more often and becoming more intense, what that means for the infrastructure in the likelihood of spilling. I am not sure that they have analyzed that adequately. So, I would like them to do that.

CR-7

Oh. I kind of mentioned this before, but, yeah, I do want them to look at the -- in terms of air emissions, the nitrogen oxide and volatile organic compounds, because we do have an issue in Texas -- Houston, in particular -- but it's been a problem in

Cyrus Reed (continued)

Beaumont and Port Arthur, at least in the past, of ground level ozone in the summer. So, I want to make sure that any oil and gas leases we're doing aren't going to affect ozone because that affects kids and the elderly, in particular.

CR-8

And if we are going to allow oil and gas drilling, I sure want there to be good rules in place so that we're not allowing fugitive emissions of things, and there should be a good leak detention and repair program for all offshore equipment and rigs. So, I would want to make sure that was in place.

CR-9

And, you know, finally -- I guess I'll try to do this in written form -- but I would make the argument, they haven't really analyzed the impacts in the CIS of a catastrophic oil spill, like the one that occurred six years ago, in making sure that you look at that situation again and what's changed since six years ago, I think would be important.

CR-10

And I have got some -- you know, I've got a final comment. Just that NEPA really does require to look at a -- all the alternatives to the proposed action, but, again, the Actions A, B, C, D, and E, you know, are really just -- I mean, B is different because it's no leasing, but the other ones are really just small variations. And, so, I really would want them to look at

Cyrus Reed (continued)

CR-10

the need overall of holding these leases. I would want them to look at an alternative that would really prohibit drilling in certain sensitive areas and an alternative that would restrict the number of wells to be drilled and how they could meet sort of the, you know, the overall Paris accord of keeping global warming to below 1.5 or 2 degrees Celsius. How does drilling fit into that overall plan and how much would be allowed? I guess I would end it there.

****

Kim Ross

Testimony removed here to focus on the comment below. Please refer to the comment from Rachel Walsh to see the removed testimony.

KIM ROSS: My name is Kim Ross, R-O-S-S.

KR-1

So I have four points. First from an air quality perspective the Environmental Impact Statement fails to adequately address nitrogen oxide and other volatile organic compounds that are found in ground level ozone formation which, and those would result from proposed leases so they fail to consider the harm that could potentially be impacted on both marine life and also the public health of Gulf communities. Second relates to methane leaks.

KR-2

So, you know, proposed leases can have an impact on methane leaks in the drilling, obviously. So methane leaks can lead to greater public health impacts and also can lead to greater marine life health impacts.

KR-3

Also the other problem with methane leaks impact climate change and that's probably the number one issue with the Environmental Impact Statement is that it doesn't address this document which intends to have lease sales over the next five years but that impacts the next 50 plus years. That climate

Kim Ross (continued)

KR-3

change is not adequately addressed from that perspective for we know that in the next 50 to 100 years we'll be seeing major impacts from sea level rise and other things so climate change is not adequately addressed in the Impact -- Environmental Impact Statement.

KR-4

And then finally BOEM and BSEE insist that oil and gas activities are regulated in that there have been changes from since the Deep Water Horizon Macondo oil spill. Several federal studies do find that those changes are still lacking and so we need to make sure that there's actual changes before we go forward with any of these sales so I would recommend if possible to select I think it's Alternative E, which is to do nothing. To let's avoid lease sales and let's make these changes and reconsider in another, at another time and if not, then definitely these other issues around air quality and methane need to be taken into account.

(Meeting concluded at 7:30 p.m. Central Time.)

Kim Schultz

BISON CONNECT

Multisale EIS 2017-2022, BOEM <multisaleeis2017-2022@boem.gov>

Gulf of Mexico the Environmental Impact Statement
1 message

Kim Fri, May 20, 2016 at 2:30 PM
To: multisaleeis2017-2022@boem.gov

Dear Mr. Goeke,

I wish to add my comments concerning the Environmental Impact Statement for the further drilling in the Gulf of Mexico. Truthfully, I can not believe that I need to take time out of my day to address this subject. The word stupid is the foremost thought that comes to mind.

I live in Pensacola, Florida and have seen first hand what can go wrong when drilling for oil in the Gulf. And just this year, I had seen dead wildlife and black sand once again, after seeing a ship sitting shortly south off of Pensacola Beach for three weeks or more. It was told by the local newspaper that they were dredging the sand. That simple act alone demonstrated the hidden dangers that still linger within our beloved Gulf of Mexico.

The current health of the Gulf of Mexico is totally unacceptable, and the science supports this statement. And I know for a fact that you are well aware of the dangers of further drilling.

Never mind all of the toxic waste that goes with building a platform, just this month alone, it was reported that Shell spilled 90,000 gallons of oil in the Gulf.

KS-1

Please, I beg you not to allow further drilling in the Gulf of Mexico. I've done my part by writing this letter to you. Now it's up to you to be brave and do what you know is right in your heart, not your head, but your heart.

Much love.

Sincerely,

Kim Schulz

Sally Stevens

PUBLIC SUBMISSION

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Docket: BOEM-2016-0009
The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0020
Comment from Sally Stevens, NA

Submitter Information

Name: Sally Stevens
Address:

Email:
Phone:
Organization: NA

General Comment

As a resident of the Gulf Coast for 27 years I have watched as the oil and gas industry has continued its march in destroying communities and livelihoods throughout the region over the 3 decades. The destruction has benefited so very few while having extreme negative impact of the lives and livelihoods of far too many - a negative impact

Sally Stevens (continued)

on one of America's most vital, important, needed and productive regions. It is time to change course and restore our region to health before it is too late --- BOEM must therefore adopt the no-action alternative and end new oil and gas leasing in federal waters. Such action is necessary to protect our climate, oceans, coastal environments and local communities from dangerous offshore drilling.

SS-1

Robert Desmarais Sullivan

U.S. Department of the Interior
Bureau of Ocean Energy Management

BOEM

Public Meetings for the
Draft Multisale Environmental Impact Statement
on Proposed OCS Oil and Gas Lease Sales in the Gulf of Mexico

COMMENT SHEET

Comments: PLEASE PRINT

RDS-1

The Bureau of OCEAN ENERGY MANAGEMENT has obligations to the citizens of the United States to find alternative ways of managing energy from the oceans.

Fossil fuels have to end, as do any fuels that produce carbon dioxide and methane. That was the agreement in Paris in December of 2015. On Earth Day of 2016, the US signed the agreement.

Is this another meaningless US treaty like the many signed with Native peoples, or will the US respect this one, in view of the fact the ignoring it could actually destroy the US in a fiery climate change.

I believe BOEM as a responsible federal agency can play an active role in directing the answers.

Name: Robert Desmarais Sullivan
Title:
Organization: First Unitarian Universalist Church of NO
Address:
City, State, & Zip Code:

Comments are not limited to the space on this sheet. Please feel free to add additional sheets if necessary.

Robert Desmarais Sullivan (continued)

BOEM Hearing on Draft Statement on Environmental Impact (May 12, 2016)

RDS-2

This hearing is intended to discuss the environmental impacts of the planned leases. I can do that. The Draft Environmental Impact Statement available on the website is a rhetorical hodge-podge of deception from start to finish. It outlines in detail all possible impacts on all possible creatures, and it states that impacts on every living creature except human beings will be minor or negligeable. Only on human beings is impact said to be important. It suggests the likelihood of an accident is minimal. This poppycock is unacceptable in a government document purporting to be scientific. We heard this routine years ago about the Deepwater Horizon. I am delighted at least that the walrus is not *on its list of potentially impacted creatures. . . . AND SO, VOILÀ!* As requested, I have commented on the environmental impact statement, AND NOW I will address the question of whether there should even be leases at all. . . . There would be no need to evaluate an environmental impact statement, if the arrogant perversion of the act of leasing was acknowledged. The Gulf of Mexico is not for sale. The Bureau of Ocean Energy Management does not *have the moral right to lease it.* Our lands, waters and air are not mere resources for the petrochemical industry. They are the air, water and land of the human race. . . . In addition, the President of the United States has signed the Paris Accords, which state that fossil fuels must be reduced in order to keep the Earth's temperatures below 1.5 degrees above pre-industrial levels, so the Gulf is being offered for lease in contradiction of this accord. Because the US has signed onto the accord, it is immoral if not illegal for these leases to be considered at all. If that moral principle is not recognized at this time, the young people will force recognition in coming years, furious with this generation's greed. . . . This is a moral, not a legal, issue. Cleaning the planet is a moral, not legal, objective. Industry and government have no choice but to change. We have to keep the Earth clean for our own survival. We do not need science to tell us this, though we have scientists telling us this. . . . Right now in the first two weeks of May, we are seeing demonstrations around the world demanding we break free of fossil fuels. Residing in Louisiana, where our federal senators and all representatives except Cedric Richmond, deny that man's actions have to do with warming the Earth, we may of course be *discouraged. We may just wonder where the denials come from.* Then I remember. They come from elegant lunches with petrochemical-industry lobbyists. The Industry has known for years that burning fossil fuels produces climate change, but our officials somehow do not know. . . . We now live in a post-Paris world. The treaty was signed on April 20, Earth Day, by leaders of 175 countries, including the United States. It is a time to proclaim with clear voices and demonstrate with strong actions that we will create a new Louisiana with clean water, clean air, clean soil and clean energy.

ROBERT DESMARAIS SULLIVAN (May 10, 2016)

Diana Tomlinson

6/6/2016 DEPARTMENT OF THE INTERIOR Mail - No New Oil and Gas Leases in the Gulf of Mexico

BISON CONNECT

Multisale EIS 2017-2022, BOEM <multisaleeis2017-2022@boem.gov>

No New Oil and Gas Leases in the Gulf of Mexico

1 message

Diana Tomlinson Sun, Jun 5, 2016 at 3:00 PM
Reply-To:
To: multisaleeis2017-2022@boem.gov

DT-1

I am writing to demand a termination to all new oil and gas leases in federal waters in the Gulf of Mexico. The Bureau of Ocean Energy Management is considering lease options for five year beginning in 2017. This would allow drilling over the next 70 years putting wildlife and coastal communities at risk. Each time there is an oil spill thousands of endangered organisms are at risk as well as recreational and commercial fisheries.

For the past six years, the Gulf of Mexico has been on a recovery path from all of the damage sustained by the Deepwater Horizon disaster and has a long way to go to be as healthy as it once was. Any new drilling would lead to more offshore developments and accelerate the potential of spills and accidents. This is why it is prudent to close off any new drilling in the Gulf of Mexico.

Sincerely,

Diana Tomlinson

https://mail.google.com/mail/b/377/u/0/?ui=2&ik=5765db2e66&view=pt&search=inbox&th=15522272f64b1763&siml=15522272f64b1763 1/1

David Underhill

BOEM PUBLIC MEETING - MOBILE - MAY 18, 2016

8

Comment by David Underhill

DAVID UNDERHILL:

The Environmental Impact Statement for these lease sales says on page Roman numeral V, quote: Potential contributions to cumulative impacts resulting from activities associated with the proposed actions are also analyzed, unquote.

And traditionally phrases like that in an EIS has referred to drilling, pipe laying, service ship operations and such activities in the immediate vicinity of leases or nearby onshore support facilities, but the Paris Climate Agreement that was recently ceremonially signed at the United Nations is now the formal policy of the U.S. Government, calling for shrinking greenhouse gases to protect the climate.

DU-1

And that makes it the duty of BOEM to consider the cumulative impact of these leases have on the effects on the climate when the oil and gas extracted from the leases is burned.

Also, an accumulating body of case law and administrative rulings is moving in the

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David Underhill (continued)

BOEM PUBLIC MEETING - MOBILE - MAY 18, 2016

same direction. The cumulative impact of granting a lease or issuing a permit must include consideration of burning the oil or coal or whatever fossil fuel results from this decision. And in those circumstances, BOEM needs to expand the scope of its cumulative impact reviews to explicitly include the climate effects of its decisions about whether to issue leases.

The EIS also says, page Roman numeral VIII, quote: The need for the proposed actions is to further the orderly development of OCS resources in an environmentally and economically responsible manner, unquote.

My question is, how responsible can any action be if it results in climate disruption that melts the glaciers, raises sea levels, and floods the coasts?

The end.

\- - -

Margie Vicknair-Pray

PUBLIC SUBMISSION

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Docket: BOEM-2016-0009
The Bureau of Ocean Energy Management is announcing the availability of a Draft Environmental Impact Statement for the 2017-2022 Gulf of Mexico OCS oil and gas lease sales.

Comment On: BOEM-2016-0009-0001
Oil and Gas Lease Sales: Outer Continental Shelf, Gulf of Mexico, Oil and Gas Lease Sales for 2017-2022

Document: BOEM-2016-0009-DRAFT-0003
Comment from Margie Vicknair-Pray, NA

Submitter Information

Name: Margie Vicknair-Pray
Address:

Email:
Organization: NA

General Comment

MVP-1

I would like a copy of the EIS for the Gulf of Mexico on compact disc. Considering the major affronts to the Gulf in recent years, including the recent spill by Shell less than 100 miles south of Port Fourchon, LA, I would hope that someone of intelligence and power in your agency will have made an assessment that drilling in the Gulf of Mexico is killing not only the Gulf, but the Louisiana coastal marshes, and eventually the

Margie Vicknair-Pray (continued)

MVP-1

entirety of oceans of the world. You can't possibly believe that this is a good thing. I'm giving you credit for having some basic intelligence and a lack of greed.

Rachel Walsh

Testimony removed here to focus on the comment below. Please refer to the comment from Brenda Warger to see the removed testimony.

RACHEL WALSH: My name is Rachel Walsh, R-A-C-H-E-L, W-A-L-S-H. I believe that we need to have no new leases in the Gulf of Mexico. I believe that we need to leave the oil and gas in the ground

RW-1

Rachel Walsh (continued)

RW-1

if we're going to effectively combat climate change. We need to be pursuing renewable energy as opposed to selling new oil and gas leases. Climate change is primarily driven by the combustion of fossil fuels which poses a severe threat to health, welfare, ecosystems, and the economy of the United States and the world. The Paris Climate Agreement was signed by 197 countries, including the United States, and it requires rapid and robust emission reductions to be effective, therefore, it's important to restrict new leases from being sold because halting new oil and gas leases off our coasts would keep up to 62 billion tons of carbon emissions in the ground.

RW-2

I also feel that the Bureau of Ocean Management fails to realize the great potential the Gulf has for alternative and renewable energy development including offshore wind, floating solar, tide and wave energy and associated onshore development. I think those are the types of things that we should be pursuing instead if we're serious about combating climate change.

RW-3

I also feel that the Bureau of Ocean Management fails to consider the alternative values and uses that the Gulf of Mexico provides such as the

Rachel Walsh (continued)

RW-3

significant values it provides to the tourism and fishing industries, and I feel these would be greatly depreciated by oil and gas drilling, further oil and gas drilling in the Gulf of Mexico.

Testimony removed here to focus on the comment above. Please refer to the comment from Kim Ross to see the removed testimony.

Brenda Warger

3

BW-1

BRENDA WARGER: I would like, I came here today because I would like to say that I am in opposition to the sale of new leases for oil and drilling in the Gulf because they will deepen the climate crisis and reverse the course on President Obama's commitment to combat climate change. I urge you to halt all new oil and gas lease sales in federal water and keep these dirty fossil fuels in the ground.

BW-2

Also I am in opposition because I feel that BOEM underestimates the amount of climate changes gases and their environmental impact because they fail to adequately analyze past, present and future foreseeable actions in the Environmental Impact Statement.

BW-3

And finally my last statement I guess is that I'm in opposition additionally because while BOEM's EIS acknowledges that climate change is occurring, it fails to properly disclose the enormity of the problem and the contribution of expanded offshore oil drilling in the Gulf would have to the problem and that's all I have to say. Thank you very much.

Testimony removed here to focus on the comment above. Please refer to the comment from Rachel Walsh to see the removed testimony.

GULF BAY REPORTING

Sky Yardley

BOEM MEETING

May 12, 2016
Page 9

Testimony removed here to focus on the comment above. Please refer to the comment from Renate Heurich to see the removed testimony.

MR. SKY YARDLEY:

I'm here to tell BOEM that attempted extraction of oil and gas is attempted rape. Who is asking consent? Consent from whom? This is the Earth we live on. She gives us all our lives. Some of us think it's okay to take and keep on taking forever. We deserve a convenient life. The oil is just sitting there, why not take it? Oil and gas are not free. BOEM is organized, forcible rape.

When groups in Africa use organized, forcible rape as a tactic, we "Tsk, Tsk" and shake our heads. When Serbs and Croats in Europe use organized,

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Sky Yardley (continued)

forcible rape as a strategy, "Tsk, tsk. What a shame."

SY-1

Every drop of oil extracted has potential to leak. Deepwater Horizon, oil trains crashing, methane releases in California, other places. Every drop that's burned leaves to another felony, an even greater felony, murder, murder of our whole planet. Leave the oil and the gas in the ground so we can all live.

Testimony removed here to focus on the comment above. Please refer to the comment from Kellan Lyman to see the removed testimony.

John Young

BISON CONNECT

Multisale EIS 2017-2022, BOEM <multisaleeis2017-2022@boem.gov>

No New Offshore Oil and Gas Exploration, Leases, or Permitting Until BOEM & BSEE Illues Resolved

John Young Mon, May 23, 2016 at 10:28 AM
Reply-To:
To: multisaleeis2017-2022@boem.gov

Dear Chief Goeke,

Halt all new oil & gas related lease sales, exploration, and operation permitting in federal waters until AFTER critical, long-standing, BOEM & BSEE issues are resolved.

The folks involved have had long enough to make any changes they'll willingly make -- given the histories of the BOEM, BSEE, and other federal agencies/bureaus such as the BIS; their legislative power; and their ability to manipulate public opinion.

JY-1

At least no new leases and/or permitting until the Bureau of Ocean Energy Management and Bureau of Safety and Environmental Enforcement fully reveal all the offshore drilling and fracking they've already approved, comes clean about how they quietly approved such operations, and put fully funded and staffed and transparent rules and procedures in place to adequately monitor, shut down, remediate, and punish violations.

JY-2

Have the Environmental Defense Center and Surfrider Foundation objections to the draft Programmatic Environmental Assessment of these agencies been evaluated and incorporated into the assessment? [See "Flaws in Government's Analysis of Offshore Fracking and Acidizing Exposed by Environmental Groups," Environmental Defense Center, 03-23-2016, Santa Barbara Independent, http://www.independent.com/pr/2016/mar/23/flaws-governments-analysis-offshore-fracking-and-a/]

If so, let us know. If not, give us an update and a chance to join in on the negotiations.

JY-3

Has the Government Accountability Office's been satisfied yet that the Bureau of Safety and Environmental Enforcement's investigative and enforcement policies, procedures, and action are now adequate? [See "GAO: BSEE makes little progress on offshore oil, gas reforms," Nick Snow, 03-21-2016, Oil & Gas Journal, http://www.ogj.com/articles/print/volume-114/issue-3b/general-interest/gao-bsee-makes-little-progress-on-offshore-oil-gas-reforms.html]

If so, let us know. If not, give us an update and a chance to join in on the negotiations. As of 03-23-2016, the Gulf Restoration Network reported little action on the BSEE rule changes recommendations following the 2010 BP Deepwater Horizon disaster [http://healthygulf.org/protect-gulf-oil-disasters-0/].

JY-4

Has the BSEE implemented the proposed "well control rule" to significantly strengthen safety of drilling and development against BP Deepwater Horizon type blowout disasters?. [See "Protect Our Waters from Oil Disasters," Gulf Restoration Network, 03-22-2016, http://healthygulf.org/protect-our-waters-oil-disasters/]

These are SERIOUS problems that MUST BE publically discussed and adequately resolved before either the BOEM and BSEE are entrusted in making the serious and long term decisions involved in the approval of new exploration let alone leasing in our Gulf and/or Artic waters.

Especially if you add in how the US Department of Commerce's Bureau of Industry and Security quietly exempted some forms of processed condensate from the Oil Export Ban before the ban was lifted (See "What the Northwest Needs to Know about the Crude Oil Export Ban Lift," 12-16-2015, Tarika Powell, 12-16-2015, http://www.sightline.org/2015/12/16/what-the-northwest-needs-to-know-about-the-crude-oil-export-ban-lift/?utm_source=Sightline+Newsletters&utm_campaign=6b2162111d-SightlineWeekly&utm_medium=email&utm_term=0_18df351f8f-6b2162111d-296282777/).

John Young (continued)

And especially given the present questions a number of attorney generals are now asking about the honest of the big oil and gas companies (starting with Exxon Mobile).

JY-5

Here on the south most tip of Texas, Shell and other oil and gas companies have boasted to industry insiders and investors regarding their offshore operations 135 miles due east of Brownsville, TX. But there's been nothing in the local news about how, for example, Shell has drilled deeper and pressed the limits harder there than BP's catastrophic Deepwater Horizon. [See See "Drilling picks up across the Perdido Foldbelt," Anne Leonard & Tom Liskey, Offshore, 01-13-2016, http://www.offshore-mag.com/articles/print/volume-76/issue-1/gulf-of-mexico/drilling-picks-up-across-the-perdido-foldbelt.html/]

As long as the oil and gas companies and interests, and federal regulatory agencies (such as BOEM, BSEE, and BIS) keep a lid on public information and disclosures, quietly making private deals and permitting operations in the shadows), we MUST keep a lid on any further exploration, leasing, and permitting.

Sincerely,

John Young

KEYWORD INDEX

KEYWORD INDEX

The Department of the Interior Mission

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors the Nation's trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The Bureau of Ocean Energy Management Mission

The Bureau of Ocean Energy Management (BOEM) is responsible for managing development of U.S. Outer Continental Shelf energy and mineral resources in an environmentally and economically responsible way.