

Issuance of Leases for Wind Resource Data Collection on the Outer Continental Shelf Offshore Delaware and New Jersey Environmental Assessment

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FINDING OF NO SIGNIFICANT IMPACT

Issuance of Leases for Wind Resource Data Collection on the Outer Continental Shelf Offshore Delaware and New Jersey

As required by the National Environmental Policy Act (NEPA), the U.S. Department of Interior (USDOI), Minerals Management Service (MMS) has prepared an environmental assessment (EA) to determine whether issuance of leases under MMS's alternative energy interim policy authorizing wind resource data collection on seven lease blocks located on the Outer Continental Shelf (OCS) offshore Delaware and New Jersey would have a significant effect on the human environment and whether an environmental impact statement (EIS) must be prepared.

The purpose of the proposed action is to grant access to the designated areas of the seabed for initial site assessment activities that would support the ultimate deployment of commercial-scale renewable energy production on the OCS offshore Delaware and New Jersey. The proposed action is needed to adequately assess wind and environmental resources of the proposed lease areas due to the inadequacy or lack of existing site-specific data, in order to determine whether these locations are suitable and will support commercial-scale renewable energy production.

The MMS received nominations for these seven lease blocks. These proposed leases include the following lease blocks: Salisbury NJ 18-05 Block 6325, Hudson Canyon NJ 18-03 Block 6451, and Wilmington NJ 18-02 Blocks 6738, 6931, 6936, 7033, and 7131. The EA examines the potential effects of wind resource data collection activities offshore Delaware and New Jersey that would occur over five years. Such activities authorized by the MMS leases would include construction, operation and decommissioning of seven meteorological towers with oceanographic data collection devices.

Environmental and Socioeconomic Consequences of the Proposed Action

Under the proposed action, which is the preferred alternative, the MMS would issue all seven proposed leases off of Delaware and New Jersey proposed under the interim policy. According to the analyses set forth in Chapter 4.1 of the EA, approval of all seven proposed leases would result in the following impacts:

Air Quality: Due to the short duration or low level of emissions from routine activities, potential impacts on ambient air quality from the proposed action would be negligible to minor. A non-routine event such as a diesel spill would have short-term, minor impacts on ambient air quality. Due to the distance from shore, neither routine activities nor non-routine events would impact onshore air quality including the Brigantine Class I Area.

Water Quality: Impacts to coastal and marine waters from routine activities associated with the proposed action should be of a short duration and remain minimal, as long as regulatory requirements are followed. Minimal impacts would result from a spill since diesel is light and would evaporate and biodegrade within a few days. Since collisions occur infrequently, the potential impacts to water quality are not expected to be significant.

Coastal Habitats: No direct impacts on coastal habitats would occur from routine activities as a result of the proposed action due to the distance of the proposed leases from shore and the use of existing coastal facilities. Indirect impacts from routine activities may occur from wake erosion caused by vessel traffic in support of the proposed action. Assuming approach channels to ports used would be armored and speed limits enforced, a negligible increase, if any, to wake induced erosion may occur. Assuming compliance with U.S. Coast Guard (USCG) requirements relating to prevention and control of oil spills, potential impacts to coastal habitats from an accidental diesel fuel spill would be avoided or minimized.

Benthic Resources: Impacts of site assessment surveys, and construction, operation, and removal of meteorological towers on benthic communities would be short-term in duration and negligible in extent. The main potential impacts from routine activities on benthic communities would be direct contact by anchors, driven piles, and scour protection that could cause crushing or smothering. If contact occurs, the ability of soft-bottom communities to recover in number of individuals to pre-disturbance levels may take 1-3 years. Recovery of community composition or trophic structure that exploits all ecologic niches available may take longer. Potential impacts from non-routine events, such as a diesel spill, are also considered to be negligible, because a diesel spill would likely be restricted to the sea surface and would dissipate rapidly. For benthic communities, the MMS's primary mitigation strategy is avoidance. The exact location of meteorological towers would be adjusted to avoid adverse effects to sensitive benthic communities, if present.

Marine Mammals: The proposed action and subsequent effects to marine mammals are expected to be short term and would result in minimal to negligible behavioral harassment and would not result in injury or death. The mitigation and monitoring measures proposed would minimize or eliminate the potential for harmful effects on marine mammals from vessel traffic, seismic surveys, construction activities including pile driving, and accidental introduction of trash and debris. Therefore, the proposed action would not significantly affect marine mammals.

Sea Turtles: The proposed action and subsequent effects to sea turtles are expected to be short term and would result in minimal to negligible impacts. The mitigation and monitoring measures proposed would minimize or eliminate the potential for harmful effects on sea turtles from vessel traffic, seismic surveys, construction activities including pile driving, and intentional and/or accidental introduction of trash and debris. Therefore, the proposed action would not significantly affect sea turtles.

Birds: While birds may be affected by vessel discharges and the presence of meteorological towers, accidental fuel release is unlikely and the risk of collision would be minor due to the small number of meteorological towers proposed and their distance offshore. The proposed mitigation measures would reduce or eliminate the potential for effects from the presence of meteorological towers on birds. Therefore, the proposed action is not expected significantly impact marine and coastal birds, including ESA-listed and migratory birds.

Bats: While it is unlikely that bat species would be foraging or migrating through the area, these mammals may on occasion be driven to the project area by prevailing winds and weather. If present, avoidance or attraction responses to the structures because of noise, lighting, and the visual presence could occur. The risk of collision is minor. Mitigation measures including the use of anti-perching devices, lighting restrictions, and prohibition on guy wires would further reduce or eliminate potential impacts. Because of the distance between the proposed leases, there would be no additive effect of constructing all seven proposed meteorological towers on bats. The proposed data collection activities may assist in future environmental analyses of impacts of OCS activities on bats.

Fish Resources and Essential Fish Habitat (EFH): Due to the small number of vessel trips and limited construction required, noise associated with siting, construction, operation and decommissioning activities would have no detectable or persistent effects on fish resources. Localized turbidity is expected to be minimal due to the nature of the substrate, the limited area of activity and the use of technologies that minimize sediment disturbance. Fish attraction to the meteorological towers is not expected to be marked since each would be a single structure, with less complexity than true artificial reefs. The positive and negative effects to EFH of the small amount of extra hard surface habitat would be negligible and be lost at decommissioning. The proposed mitigation measures would reduce potential impacts of noise from pile driving on fish and accidental loss of trash and debris on EFH.

Offshore Cultural Resources: Should contact between the proposed bottom-disturbing activities and an offshore cultural site occur, there would likely be damage to or loss of significant and/or unique archaeological information. However the proposed Archaeological Resources Stipulation would reduce or eliminate the risk of those impacts from occurring. Therefore, no impacts to offshore cultural resources are expected.

Recreational Resources: Due to the distance of the proposed lease areas from shore and that no new coastal infrastructure is proposed, no impacts to coastal recreational resources are expected. The proposed mitigation measure would further reduce or eliminate the risk of impacts from the accidental release of trash and debris on recreational beach usage.

Demographics: The proposed leases would be located 8-17 miles from the nearest shoreline. Therefore, activities occurring within the proposed lease areas would have no impacts on environmental or health effects on minority or low-income people. Only the use of existing coastal facilities has the potential to impact minority or low-income people. However, several existing fabrication sites, staging areas, and ports in Delaware and New Jersey would support survey, construction, operation and decommissioning activities. No expansion of these existing areas is anticipated to support the proposed action. Due to the distance from shore and the use of existing facilities, the proposed action is not expected to have disproportionately high or adverse environmental or health effects on minority or low-income people.

Land Use and Coastal Infrastructure: Existing ports or industrial areas are expected to be used, and expansion of these existing facilities is not anticipated to support the proposed action. Therefore, no significant impact on land use or coastal infrastructure is expected.

Commercial and Recreational Fishing Activities: The small increase in vessel activity that would occur and the presence of the meteorological towers would not measurably affect commercial or recreational fishing activities, catchability of fish and shellfish, or navigation. Any impacts would be of short duration, a limited area, and temporary. The proposed mitigation measures would further reduce or eliminate the impacts due to noise from pile driving and intentional and/or accidental introduction of debris into the marine environment.

Alternatives to the Proposed Action

The EA also examined the potential effects of two alternatives to the proposed action: Alternative A—Reduced Number of Leases and Alternative B—No Action.

Under the Alternative A, fewer leases would be issued offshore New Jersey for the installation of meteorological or marine data collection facilities to assess renewable energy resources. The types of activities expected to occur under Alternative A would be similar to those expected under the proposed action. However, there would be substantially less activity related to the construction, operation and decommissioning of just four meteorological towers. Consequently, the already negligible to minor potential impacts related to the proposed action would be even less under Alternative A.

The NEPA requires the analysis of a no action alternative. Under Alternative B, no leases would be issued under the interim policy authorizing installation of a data collection facility and associated activities offshore Delaware or New Jersey. Any potential environmental and socioeconomic impacts from these activities would not occur or would be postponed. However, the no-action alternative would not satisfy the purpose and need of the action.

Under these alternatives to the proposed action, opportunities for the collection of meteorological, oceanographic and biological data in the proposed offshore areas would be reduced or postponed, or would not occur. Consequently, the data necessary to successfully determine the feasibility of the lease areas for commercial wind energy development from a dedicated data collection facility would not be collected or collected at fewer sites, thus eliminating or reducing number of possible sites to develop

commercial-scale renewable energy production on the OCS offshore New Jersey and Delaware with minimal benefit to the environment.

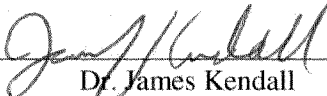
Supporting Document

Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement, October 2007 (USDOJ, MMS, 2007) (available upon request).

Conclusion

Approval of the proposed action that would involve issuance of all seven proposed leases would not result in any significant impacts. Offshore activities would result in localized impacts, and impacts of individual meteorological towers and their associated activities would not overlap due to the distance between leases. Therefore, there would be no additive effect on offshore environmental resources of approving multiple locations. The proposed leases would be located 8-17 miles from the nearest shoreline and result in virtually no visual impacts. There would be no need to expand existing onshore facilities or construct new facilities to support staging and fabrication of meteorological towers. There would be a small increase in vessel traffic associated with limited construction and decommissioning activities for very short time periods. During operation of the proposed meteorological towers, there would be no significant impacts on air and water quality; coastal, wildlife and archeological resources; and fishing and recreational activities. Furthermore, MMS proposes several mitigation measures in the form of lease stipulations that would be added to the lease terms that would reduce or eliminate the potential impacts to the environment.

Based on the analyses in the EA, no significant effects on the human environment have been identified that would result from the proposed action. Therefore, MMS has concluded that an EIS is not required and is issuing this Finding of No Significant Impact.



Dr. James Kendall
Chief, Environmental Division



Date

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1 THE PROPOSED ACTION

1.1 Introduction

The proposed action is the issuance of leases under the Minerals Management Service's (MMS) alternative energy interim policy¹ authorizing wind resource data collection on seven lease blocks located on the Outer Continental Shelf (OCS) offshore Delaware and New Jersey (see Figure 1-1 and Table 1-1). The proposed lease blocks are Salisbury NJ 18-05 Block 6325, Hudson Canyon NJ 18-03 Block 6451, and Wilmington NJ 18-02 Blocks 6738, 6931, 6936, 7033, and 7131. Three companies have proposed wind resource data collection activities on these lease blocks: Bluewater Wind Delaware LLC (Bluewater), Deepwater Wind, LLC (Deepwater), and Fishermen's Energy of New Jersey, LLC (FERN). As required by the National Environmental Policy Act (NEPA), this Environmental Assessment (EA) was prepared to determine whether or not issuance of leases that would authorize wind resource data collection on the OCS offshore Delaware and New Jersey would have a significant effect on the human environment and whether an environmental impact statement (EIS) must be prepared.

This EA examines potential effects of activities that would occur over the life of the leases issued offshore Delaware and New Jersey, including site assessment surveys; environmental research; and construction, operation and decommissioning of meteorological and oceanographic data collection facilities. These leases would expire after five years and confer no preferential right to acquire, develop or commercially operate any renewable energy project on the OCS. The MMS decided to prepare a single, multi-project EA for all seven proposals because the proposed lease areas located offshore of Delaware and New Jersey are not significantly different. All lease areas have similar geological and environmental characteristics, and the proposed activities would potentially impact the same environmental and socioeconomic resources.

Section 388 of the Energy Policy Act of 2005 (EPA) gave the Secretary of the United States Department of the Interior (USDOI) the authority to issue leases, easements and rights-of-way on the OCS for renewable energy activities. The MMS prepared a programmatic EIS to evaluate the impact of establishing a comprehensive, nationwide MMS Alternative Energy Program on the OCS (Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement, October 2007 (Programmatic EIS) (USDOI, MMS, 2007)). The Programmatic EIS was used to inform MMS during the drafting of the proposed rules for renewable energy activities and alternate uses of OCS facilities. This EA incorporates by reference all of the relevant material in the Programmatic EIS from which it tiers. The Programmatic EIS can be viewed on the MMS website at www.mms.gov/offshore/alternativeenergy.

On November 6, 2007, the MMS announced in the *Federal Register* an interim policy that authorizes the issuance of leases for the installation of meteorological or marine data collection facilities to assess renewable energy resources (e.g., wind, wave, and ocean current) or for the testing of renewable energy technology to produce or support production of renewable energy on the OCS.² The interim policy was established to assist the development of renewable energy development on the OCS. Among the first steps of renewable energy project development is the collection of resource data. Such data are often required by component manufacturers, such as wind turbine suppliers, and by financial backers. Thus, initial site assessment activities, such as meteorological tower installation and operation, are properly considered a first phase of commercial renewable energy production on the OCS. Similarly, activities involving the installation and operation of facilities to test renewable energy generating technologies advance the development of an alternative industry offshore and support the ultimate deployment of commercial-scale renewable energy production on the OCS.

¹ See, Request for Information and Nominations, 72 FR 214, pp. 62673-62675 (November 6, 2007).

² *Id.*

In response to the November 6, 2007 *Federal Register* notice, the MMS received over 40 nominations of areas of interest on the OCS off the West and East coasts. In April 2008 (73 *FR* 76, pp. 21152-21155), the MMS identified a subset of 16 proposed lease areas for priority consideration, which was later refined to 15 (73 *FR* 84, pp. 23490-23491). The MMS reviewed in detail all nominations received and established priority areas for initial leasing in light of considerations, such as technological complexity, geographical balance, timing needs, competing space-use issues, and relevant State-supported renewable energy activities and initiatives. The MMS also took into consideration the desirability of authorizing the advancement of activities relating to each of the renewable energy resource types cited in the nominations—wind, current, and wave. The MMS chose the priority leasing locations offshore New Jersey and Delaware largely because the installation of data collection facilities relating to wind would support the concurrent efforts by those States to foster commercial development of wind power off their coasts. Following the selection of priority lease areas, the MMS issued a notice announcing its processing priorities and, as required by statute, inquired about competing nominations for the proposed limited leases. No competing nominations were received for the areas offshore Delaware and New Jersey, allowing MMS to proceed with noncompetitive leasing and its associated environmental review.

This EA examines the impacts of issuing leases authorizing wind resource data collection on the OCS lease blocks listed below. These lease blocks are each about nine square miles, and hereafter are referred to as a proposed lease areas.

Table 1-1. Proposed Leases off of Delaware and New Jersey

Official Protraction Diagram	Block Number	Distance to Shore (miles)	Minimum Water Depth (ft)	Maximum Water Depth (ft)	Company	State
Hudson Canyon NJ18-03	6451	16	90	110	Bluewater	NJ
Wilmington NJ18-02	6738	15	80	90	Deepwater	NJ
Wilmington NJ18-02	6931	8	60	70	FERN	NJ
Wilmington NJ18-02	6936	17	70	100	Bluewater	NJ
Wilmington NJ18-02	7033	17	70	90	Deepwater	NJ
Wilmington NJ18-02	7131	15	50	100	Bluewater	NJ
Salisbury NJ18-05	6325	15	40	60	Bluewater	DE

The Programmatic EIS, from which this EA tiers, analyzes the potential impacts to environmental and socioeconomic resources from all activities that are associated with OCS renewable energy projects and alternate uses of OCS facilities including the installation of meteorological or marine data collection facilities and the testing of renewable energy technology. This EA further examines the potential effects that may be associated with meteorological and oceanographic data collection facilities including site characterization activities that could occur over the life of the limited leases including site assessment surveys; environmental research; and construction, operation and decommissioning. This EA also addresses the questions of whether or not site-specific or newly available information would indicate that site assessment activities would result in significant site-specific impacts not addressed in the Programmatic EIS.



Figure 1-1. OCS blocks proposed for wind resources data collection off of Delaware and New Jersey.

1.2 Purpose and Need

The purpose of the proposed action is to grant access to the designated areas of the seabed for initial site assessment activities, such as meteorological tower installation and operation, which may support the ultimate deployment of commercial-scale renewable energy production on the OCS offshore Delaware and New Jersey.

The proposed action is needed to adequately assess wind and environmental resources of the proposed lease areas due to the inadequacy or lack of existing site-specific data, in order to determine whether these locations are suitable and will support commercial-scale renewable energy production.

1.3 Regulatory Framework

Chapter 1.7 of the Programmatic EIS provides summaries of how the major applicable laws and regulations apply to renewable energy and alternate use projects on the OCS. Authority for MMS's Alternative Energy Program and its interim policy is found in the Outer Continental Shelf Lands Act (OCSLA) (43 U.S.C. 1331 *et seq.*). In 2005, the OCSLA was amended by the EPAct (P.L. 109-58), which authorized the Secretary of the USDOJ to issue leases, easements and rights-of-way for renewable energy activities on the OCS and alternate uses of existing OCS facilities. The environmental review of such activities is performed pursuant to the NEPA. Leases issued under the authority of the OCSLA must also comply with other Federal statutes, such as the Coastal Zone Management Act (CZMA) (16 U.S.C. 1451 *et seq.*); the Endangered Species Act of 1973 (ESA) (16 U.S.C. 1531 *et seq.*); the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801 *et seq.*); the National Marine Sanctuaries Act (16 U.S.C. 1431 *et seq.*); and the Marine Mammal Protection Act of 1972 (MMPA) (16 U.S.C. 1361 *et seq.*). The OCSLA, EPAct, and CZMA are discussed below.

OCSLA and Energy Policy Act of 2005

The OCSLA established Federal jurisdiction over submerged lands on the OCS seaward of State boundaries and authorized the Secretary of the USDOJ to issue mineral leases on the OCS. In 2005, Section 388 of the EPAct amended the OCSLA and expanded the USDOJ's authority to issue leases, easements, and rights-of-way on the OCS for activities that produce or support the production, transportation, or transmission of energy from sources other than oil and gas and for activities that use, for energy-related or other authorized marine-related purposes, facilities currently or previously used for activities authorized under the OCSLA.

Coastal Zone Management Act

The CZMA was enacted by Congress in 1972 and created a national coastal program that involves State and local governments in the management of coastal resources. This national coastal management program is implemented by individual State coastal management programs in partnership with the Federal Government. The CZMA Federal consistency regulations at 15 CFR 930 require that Federal activities, such as lease issuance, be consistent to the maximum extent practicable with the enforceable policies of a State's coastal management program. The Federal consistency regulations also require that other federally-approved activities (e.g., activities requiring Federal permits) be consistent with a State's federally approved coastal management program. The Federal consistency requirement is an important mechanism to address coastal effects of activities permitted by the Federal Government, to ensure adequate Federal and applicant consideration of State coastal management programs, and to minimize conflicts between States and Federal agencies. The CZMA is administered by the Office of Ocean and Coastal Resource Management (OCRM) within the National Ocean Service of the National Oceanic and Atmospheric Administration (NOAA). The CZMA's implementing regulations are found at 15 CFR Part 930.

State Coastal Zone Management Programs

Under OCRM's National Coastal Zone Management Program, a coastal State develops a State Coastal Zone Management Program (CZMP or program) that is submitted for approval. The CZMP is a comprehensive statement setting forth objectives, enforceable policies, 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 program defines what constitutes permissible land uses and water uses.

Both the States of Delaware and New Jersey have federally-approved CZMPs. Through the designated State coastal zone management agencies, local land-use entities were provided several opportunities to comment on the interim policy. In November 2008, in Rehoboth Beach, Delaware and Atlantic City, New Jersey, the MMS met with State, Federal, and local officials to discuss the interim policy. In addition, the MMS sought and received public comment on the interim policy.

The MMS prepared a Consistency Determination that was sent to the State of New Jersey on March 6, 2009. The Consistency Determination examined whether issuing the six proposed leases off New Jersey is "consistent to the maximum extent practicable" with the policies and provisions of the New Jersey CZMP, identified as enforceable by the State of New Jersey. In a letter dated May 7, 2009, the State of New Jersey concurred with MMS's Consistency Determination.

The MMS prepared a Negative Determination that was sent to the State of Delaware on March 20, 2009. Due to the insignificant effects to coastal resources and uses identified by Delaware as enforceable in the Delaware CZMP (the distance from shore of the proposed lease and single meteorological tower, the short-term nature of the proposed action, the relatively minor amount of vessel traffic, and use of existing coastal facilities and waterways), MMS concluded that the issuance of one lease authorizing wind resource data collection activities offshore Delaware would not cause "reasonably foreseeable coastal effects." In a letter dated April 24, 2009, the State of Delaware concurred with MMS's Negative Determination.

2 ALTERNATIVES AND MITIGATION MEASURES

2.1 Alternatives Including the Proposed Action

2.1.1 The Proposed Action

Under the proposed action, the MMS would issue all seven proposed leases off of Delaware and New Jersey proposed under the interim policy. The proposed lease blocks are Salisbury NJ 18-05 Block 6325, Hudson Canyon NJ 18-03 Block 6451, and Wilmington NJ 18-02 Blocks 6738, 6931, 6936, 7033, and 7131 (see Figure 1-1). These leases would grant the lessees the exclusive right, subject to the terms and conditions of the leases, to conduct limited renewable energy activities including construction, operation and decommissioning of meteorological and oceanographic data collection facilities on the leased areas. After the leases are issued, the lessees may not commence construction activities until a Project Plan is submitted to and reviewed by MMS. The Project Plan would explain construction procedural details and the engineering specifications of the facility. The MMS would have the opportunity to review the reports of the site assessment surveys that are conducted. A limited lease would confer no priority rights to subsequently develop a renewable energy facility on the OCS for generating electricity or other produced energy for commercial sale or distribution.

The impacts of the proposed action on environmental and socioeconomic resources are described in detail in Chapter 4.1 of this EA, and are not expected to be significant.

2.1.2 Alternative A—Reduced Number of Leases

Under the Alternative A, fewer leases would be issued offshore New Jersey for the installation of meteorological or marine data collection facilities to assess renewable energy resources. Leases would be

issued under the interim policy authorizing installation of a data collection facility and associated activities in four of the seven blocks proposed: 6325, 6738, 6931, and 6936. Blocks 7131, 7033, and 6451 would not be issued at this time. The analyses of impacts of Alternative A on environmental and socioeconomic resources are described in detail in Chapter 4.2 of this EA.

2.1.3 Alternative B—No Action

The NEPA requires the analysis of a No Action Alternative. Under the No Action Alternative, no leases would be issued under the interim policy authorizing installation of a data collection facility and associated activities in blocks Salisbury NJ 18–05 Block 6325, Hudson Canyon NJ 18–03 Block 6451, and Wilmington NJ 18-02 Blocks 6738, 6931, 6936, 7033, and 7131. The analyses of impacts of Alternative B are described in detail in Chapter 4.3 of this EA.

2.2 Alternatives Considered But Not Analyzed

Alternate Locations

Since MMS has undertaken a thorough public and multi-step process to identify the proposed lease areas addressed in this EA, alternate geographical areas were not considered as part of the EA. However alternate locations of the meteorological towers within the lease blocks will be considered during MMS's review of Project Plan for each lease area. The exact location of meteorological towers will be based on site assessment surveys and avoidance of environmental and cultural resources, if present.

Structure Types

This EA analyzes, under the proposed action, the potential impacts of all structure types proposed, including various fixed foundations. As described in Chapter 3.1.2.1 of this EA, a fixed foundation would be composed of a single 10-foot (ft) diameter monopile, tripod, or a steel jacket with three to four 36-inch-diameter piles. The final foundation type for each lease would be dependent on data collected during site assessment surveys, and its final selection would be included in a detailed Project Plan submitted to MMS after site assessment surveys are conducted and prior to construction. Therefore, structural characteristics, including the foundation type, were not included as alternatives in this EA.

In Bluewater's application for Block 6325, the company stated it intended to use of a jack-up barge as the foundation structure for the meteorological tower mast. During stakeholder meetings held in November 2008, MMS, U.S. Coast Guard (USCG), U.S. Army Corps of Engineers (USACE) and the State of Delaware expressed concerns about the stability and data-collection capabilities of a jack-up barge. On December 1, 2008, Bluewater withdrew the jack-up option from their application and confirmed that only a fixed foundation would be used.

2.3 Mitigation Measures

Under an interim policy lease, after the lease is issued, the lessee may not commence construction activities until a Project Plan and the site assessment survey reports are submitted to and reviewed by MMS. According to the lease, the lessee's Project Plan must contain a description of environmental protection features or measures that the lessee will use. For offshore cultural resources and biologically sensitive habitats, MMS's primary mitigation strategy has and will continue to be avoidance. The exact location of meteorological towers would be adjusted to avoid adverse effects to offshore cultural resources or biologically sensitive habitats, if present.

In addition, several mitigation measures are proposed to reduce or eliminate the potential environmental risks identified in this EA (see Appendix A). These proposed mitigation measures were developed through the analysis presented in Chapter 4.1 of this EA, and through consultation with other Federal and State agencies.

Because the proposed leases would authorize construction, operation and decommissioning of meteorological and oceanographic data collection facilities on the leased areas, the MMS can add mitigation measures for those activities in the form of lease stipulations to the lease terms and are therefore enforceable as part of the lease. Application of lease stipulations will be considered by the Assistant Secretary of the Interior for Land and Minerals (ASLM) or his designee and applied, as appropriate. In addition, minor modifications may be made during subsequent steps in the leasing process if comments indicate changes are necessary or if conditions warrant. Operational compliance of the requirements of the lease and any stipulations would be enforced through the MMS on-site inspection program.

Seismic surveys necessary to finalize engineering and placement of the proposed meteorological towers would be authorized by the USACE under a Nationwide Permit 6, Survey Activities. Therefore, any adopted mitigation measures related to seismic surveys, according to the USACE, would be included as conditions in permits issued by the USACE.

3 SCENARIO OF FORSEEABLE ACTIVITY AND IMPACT PRODUCING FACTORS

In order to describe the activity that could reasonably result from issuance of any of the seven proposed leases over its lease term of five years, the MMS developed the following activity scenario based on Bluewater, Deepwater and FERN's applications, and other proposals for installation of meteorological towers and data collection activities on the Atlantic OCS. This scenario is intended to be broad enough to cover the range of activities and structure types that would be allowed under an interim policy lease.

Cape Wind Meteorological Tower

The only meteorological tower currently installed on the OCS is located on Horseshoe Shoal, in Nantucket Sound (see Figure 3-1). In 2002, the USACE prepared an EA for the Cape Wind meteorological tower (USACE, 2002). The USACE found that "based on the evaluation of environmental effects discussed in this document, the decision on this application is not a major Federal action significantly affecting the quality of the human environment. Hence, an environmental impact statement is not required." The tower was installed in 2003 and consists of three pilings supporting a single steel pile that supports the deck. The overall height of the structure is 60 meters (197 feet) above the mean lower low water datum. The Cape Wind meteorological tower represents the smaller end of the range of structures anticipated under the interim policy. It is located in shallower water (8-10 feet) and closer to shore (approximately six miles) than most of the proposed lease areas.



Figure 3-1. Cape Wind Meteorological Tower.

Source: Cape Wind Associates, LLC.

3.1 Routine Activities

This section discusses the infrastructure and activities (impact-producing factors) that would occur as a result and over the life of the proposed leases including site assessment surveys; environmental research; and construction, operation and decommissioning of meteorological and oceanographic data collection facilities.

3.1.1 Site Assessment Surveys

Meteorological tower construction would require a detailed knowledge of surface and shallow subsurface geological and geotechnical (G&G) conditions at the project site to support activities associated with the design, fabrication, installation, operation, and removal of the structure. Integrated marine geophysical/hydrographic surveys and geotechnical/sediment sampling programs would be conducted to identify: (1) water depths, (2) seafloor morphology, (3) structural features, (4) sub-seafloor stratigraphy and structure, and (5) natural or man-made obstructions on or below the seafloor of the proposed lease area. For meteorological towers MMS would require geotechnical, shallow hazards, and archaeological surveys in most cases. Biological surveys may be required as well.

Site assessment surveys would begin immediately after lease issuance and take approximately less than one month depending on weather and sea state conditions. These surveys may be conducted throughout the lease block; however, they would likely be concentrated around the site of the meteorological tower. The survey area for each meteorological tower should include as a minimum, a 1,800 meter by 1,800 meter rectilinear grid centered on the proposed structure, and include the footprint of all potential bottom disturbing activities from construction, installation, inspection and maintenance, and decommissioning and removal activities (including anchorages). According to the lease, the results of such initial survey activities would be provided to MMS.

Chapter 3.5.2, Site Characterization, of the Programmatic EIS and the *Geological and Geophysical Exploration for Mineral Resources on the Gulf of Mexico Outer Continental Shelf—Final Programmatic Environmental Assessment* (G&G EA) (Continental Shelf Associates, 2004) discuss in detail the various technologies that could be used. These documents are summarized below and incorporated by reference.

Specifically, high resolution site surveys would be used under the proposed action to characterize the potential site of the meteorological tower. High resolution site surveys and sub-bottom profiling tools use less intense sound sources than larger air guns that are used for deeply penetrating 2D and 3D exploratory seismic surveys, and result in more shallow penetration of the seafloor and less energy (sound) introduced into the environment.

The following technologies may be used to further characterize the site of the meteorological tower as a result of the proposed action:

- To characterize an area for shallow hazards and hard-bottom areas a variety of techniques and technologies can be used including: deep-tow, side-scan sonar surveys, digital depth sounders, boomers, sparkers, GeoStar full spectrum CHIRP systems, and small airguns or arrays.
- To obtain physical and chemical data on surface sediments, geological and geochemical sampling may be used including bottom-sampling devices, piezocone penetrometers, vibracores, and core retrieved to the depth of bottom-founded structures.
- To assess benthic community composition and to identify submerged aquatic vegetation within the proposed lease area, benthic and vegetation resource sampling and surveys would be conducted.
- To locate buried pipelines, archaeological and cultural resources, disposal areas, and other metallic debris a magnetometer survey would be conducted using one of three types of sensors: an Overhauser effect sensor, a proton precession sensor, or a cesium vapor sensor.
- An archaeological survey is required by the National Historic Preservation Act of 1966, as amended, when bottom-disturbing activities are proposed in areas that the MMS has identified as having a potential for containing historic or prehistoric archaeological resources.

- Additional information on the sea bottom of the proposed lease area may be collected by using:
 - single beam bathymetry surveys;
 - multibeam echosounder and acoustic backscatter devices;
 - grab sampling and/or gravity coring; and,
 - remotely operated vehicles.

3.1.2 Structure and Equipment

3.1.2.1 Meteorological Tower and Foundation

The key component used for characterizing wind conditions is the meteorological tower. A single meteorological tower would be installed per lease block, which is approximately nine square miles. The foundation structure and scour control system, if necessary, would occupy a very small portion of the proposed lease area (less than two acres). Once installed the top of the meteorological tower would be 90-100 meters (295-328 feet) above mean sea level.

A meteorological tower consists of a mast mounted on a foundation anchored to the seafloor. The mast may be either a monopole or a lattice (same as a radio tower). A monopole mast was used for the Cape Wind meteorological tower and is shown on Figure 3-1. Examples of lattice mast are shown on Figure 3-2.

The mast and data collection devices would be mounted on a fixed or pile-supported platform. A deck would be supported by a single 10-foot diameter monopole (see Figure 3-3), tripod (see Figure 3-1), or a steel jacket with three to four 36-inch-diameter piles (see Figure 3-2). The monopole or piles would be driven about 25-100 feet into the seafloor.

The area of ocean bottom affected by the meteorological tower would range from about a couple hundred square feet if supported by a monopole to a couple thousand square feet if supported by a jacket foundation. The final foundation selection would be included in a detailed Project Plan submitted to MMS after site assessment surveys are conducted and prior to construction.

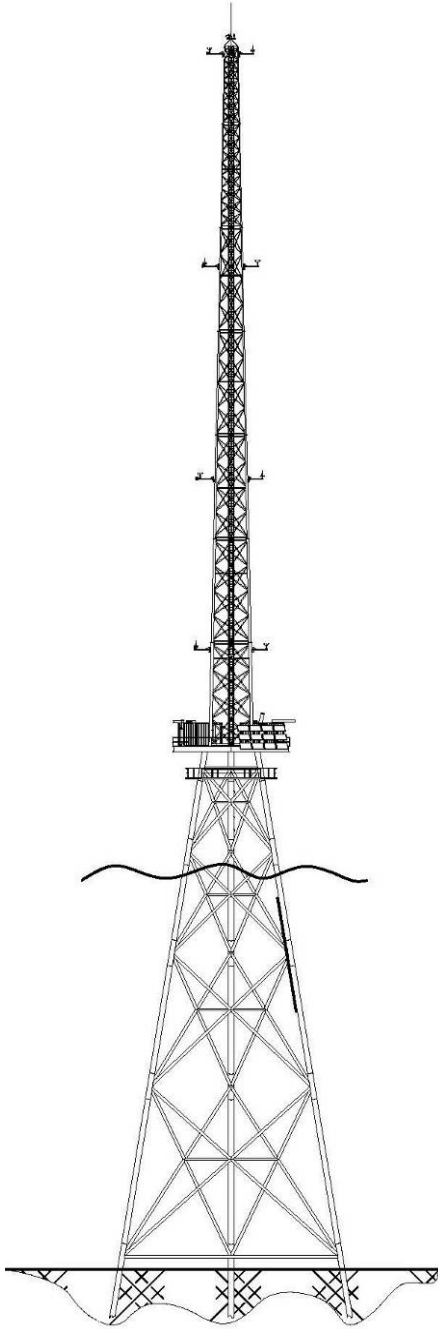


Figure 3-2. Example of a Lattice-type Mast Mounted on a Steel Jacket Foundation.

Source: Deepwater Wind, LLC.

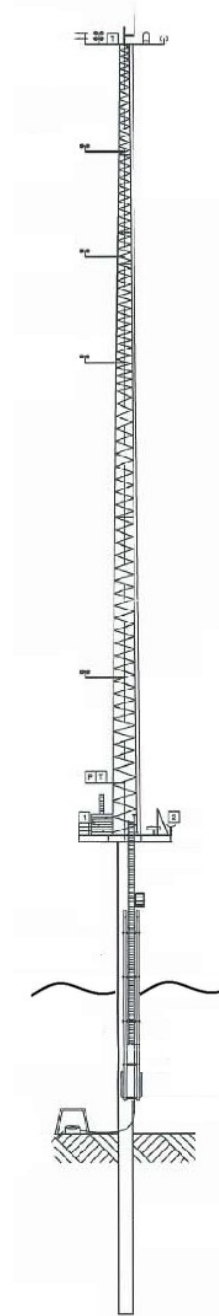


Figure 3-3. Example of a Lattice-type Mast Mounted on a Monopile Foundation.

Source: Fishermen's Energy of New Jersey, LLC.

Scour Control System

Wave action, tidal circulation, and storm waves interact with sediments on the surface of the continental shelf inducing sediment reworking and/or transport. Episodic sediment movement caused by ocean currents and waves can cause erosion or scour in the vicinity of submarine cables and around the base of offshore structures and moorings. Erosion caused by scour may undermine their structural foundations leading to potential failure.

Given the shallow waters depths of lease Block 6325, sediments in this area are likely to be subject to wave base interaction causing sediment transport and bedform modification. The remaining blocks are located in deeper waters, outside of the realm of wave base interaction and would therefore experience altering of continental shelf sediments by wave action only during storm waves and surges.

It is assumed that scour control systems will be installed where necessary. There are several methods for mitigating the effects of scour around piles, which include placement of rock armoring and mattresses of artificial (polypropylene) seagrass.

The most likely scour control system that would be used for the proposed meteorological towers would be artificial seagrass mats, which have found to be effective in shallow and deepwater (ESS Group, Inc., 2003). These mats are made of synthetic fronds that mimic seafloor vegetation to trap sediment and become buried over time. These mats would be installed by a driver or remotely operated underwater vehicle (ROV). Each mat would be anchored at 8 to 16 locations, about one foot into the sand. Once installed the mats would not require future maintenance. Depending on the water depth, the buoyant fronds would be 0.625 meters (2.05 feet) to 1.25 meters (4.10 feet) tall. The fronds would build up sand about 1-3 feet in height within one year. Based on the manufacturer's information, the sand sediment bank would extend out 1.8 to 2.2 meters (5.9 to 7.2 feet) (Seabed Scour Control Systems Ltd., 2008). Monitoring of scouring at the Cape Wind Meteorological Tower found that at the pile where two scour mats were previously installed there was a net accretion of 12" of sand (Ocean and Coastal Consultants, Inc., 2006). Around the pile where no previous scour mats were installed there was a net scour of 7 inches.

It is estimated for a pile-supported platform four mats each about 5 by 2.5 meters (16.4 by 8.2 feet) would be placed around each pile. Including the extending sediment bank, a total area disturbance of about 5,200-5,900 square feet for a three-pile structure and 5,900-7,800 square feet for a four-pile structure is estimated. For a monopole, it is estimated that eight mats about 5 by 5 meters (16.4 by 16.4 feet) would be used, and there would be a total area disturbance of about 3,700-4,000 square feet.

A rock armor scour protection system is another option by which to stabilize the structure's foundation area. Rock armor and filter layer material would be placed on the seabed using a clamshell bucket or a chute. In water depths greater than 15 feet, the median stone size would be about 50 pounds with a stone layer thickness of about three feet. It is estimated that the rock armor would impact 16,000 square feet (0.37 acres) of the seabed (ESS Group, Inc., 2006).

3.1.2.2 Equipment

Meteorological Data Collection

To obtain meteorological data, scientific measurement devices, consisting of anemometers, vanes, barometers, and temperature transmitters, would be mounted either directly on the tower, or on instrument support arms extending out approximately 10 feet. These devices may be located at three or four levels along the meteorological tower.

In addition to conventional anemometers, Light Detection and Ranging (LIDAR) and Sonic Detection and Ranging (SODAR) may be used to obtain meteorological data. LIDAR is a ground-based remote sensing technology that operates via the transmission and detection of light. SODAR is also a ground-based remote sensing technology, however operates via the transmission and detection of sound.

Ocean Monitoring Equipment

A buoy and/or other instrumentation would likely be installed on or near the meteorological tower to monitor oceanographic parameters and to collect baseline information on the presence of certain marine life. A tethered buoy would monitor ocean environmental parameters (sea surface and ocean profile) along with marine mammal activities. The buoy would be located near the meteorological towers (approximately 500 feet), but with separation distances far enough to negate any turbulence or wake effects created by the underwater platform structure. Buoy size is estimated to be up to 9 feet by 9 feet.

To measure the speed and direction of ocean currents, one to two Acoustic Doppler Current Profilers (ADCP) may be installed with each meteorological tower. The ADCP works by transmitting “pings” of highly pitched sound at a constant frequency into the water. As the sound waves travel, they ricochet off fine particles or zooplanktons suspended in the water column, and reflect back to the ADCP. The difference in frequency between the waves the ADCP sends out and the waves it receives is called the Doppler shift, which indicates the speed and direction of a parcel of water. The ADCP’s may be mounted on the seafloor or to the legs of the platform, or attached to a buoy. A seafloor-mounted ADCP would be located near the meteorological tower (approximately 500 feet) and be connected by a wire that is hand buried into the ocean bottom. A typical ADCP has 3 to 4 acoustic transducers that emit and receive acoustical pulses from 3 to 4 different directions. Frequencies would range from 300-600 kHz with a sampling rate of 1 to 60 minutes. Typical ADCP’s are about one to two feet tall and one to two feet wide. Their mooring, platform or cage would be several feet wider.

Power Equipment

Equipment would be powered by batteries charged by small wind turbines, solar panels, and/or diesel generators. The Cape Wind meteorological tower uses one small wind turbine with an approximate rotor diameter of four feet. Based on an estimate of energy requirements of the proposed meteorological towers, the MMS assumes the use of a similar wind turbine per meteorological tower (Southwest Windpower, 2008).

Other

The platform would also accommodate environmental monitoring equipment such as avian monitoring equipment (e.g., radar units, thermal imaging cameras), data logging computers, power supplies, communications equipment, material hoist, and storage containers.

A lease would confer no preferential right to acquire, develop or operate commercially any renewable energy project on the OCS. Therefore, there would be no power generation or cables installed to shore.

3.1.3 Installation

3.1.3.1 Review of Project Plan

After the lease is issued and initial survey activities are conducted, the lessee may not commence construction activities until a Project Plan is submitted to and reviewed by MMS. The lease would require that the Project Plan include the following information:

- A description of the proposed activities, including the technology intended to be utilized in conducting activities authorized by the lease and all additional surveys lessee intends to conduct;
- The surface location and water depth for all proposed facilities to be constructed in the leased area;
- General structural and project installation information;
- A description of the safety, prevention and environmental protection features or measures that Lessee would use;

- A brief description of how the meteorological tower and other components on the leased area would be removed and the leased area restored as required by the lease;
- Any other information reasonably requested by MMS to ensure lessee's activities on the OCS are conducted in a safe and environmentally sound manner; and,
- Results of the surveys authorized under the lease.

According to the lease, the MMS would have 60 calendar days from receipt of the Project Plan to raise any objections. During that period, the MMS would perform technical and environmental reviews. The MMS would evaluate the proposed activity for potential impacts relative to geohazards and manmade hazards, archaeological resources, endangered species, sensitive biological features, water and air quality, and other uses (e.g., submarine cables, military operations) of the OCS.

3.1.3.2 Timing

Installation of meteorological towers would likely occur in the spring and summer months, but could extend into the fall. Total installation time for one meteorological tower would take eight days to ten weeks depending on the type of structure installed, and the weather and sea state conditions. Due to delays caused by weather and sea state conditions, acquiring required federal permits, and availability of vessels, workers, and tower components, the proposed meteorological towers may not be installed during the first year of the 5-year lease term and may have to be installed over more than one construction season. If installation occurs over two construction seasons, then it is likely the foundation would be installed first with limited meteorological equipment mounted on the platform deck, and the mast and remaining equipment would be installed the following year.

3.1.3.3 Onshore Activity

One or more sites would be used as a fabrication site, staging area, and crew/cargo launch sites. Existing ports or industrial areas are expected to be used in support of the proposed action. Expansion of these existing facilities is not anticipated in support of the proposed survey, construction, operation, or decommissioning activities. Therefore no significant impact on land use or coastal infrastructure is expected.

Several major ports exist near the proposed leases that are suitable to support the fabrication and staging of meteorological towers. These ports include the Port of New York and New Jersey, Atlantic City, and industrial ports accessible via the Delaware Bay and Delaware River in New Jersey, Delaware, and Pennsylvania (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004).

“The Delaware Bay is home to the world’s largest freshwater port and a strategic national port. The port receives over 3,000 commercial vessel arrivals annually carrying over 78 million metric tons of cargo worth over \$47 billion. This steadily increasing trend in vessel traffic is projected to double by 2020” (Marriott and Frantz, 2008).

A platform would be constructed or fabricated onshore at a facility called a platform fabrication yard. Production operations at fabrication yards would include cutting, welding, and assembling of steel components. The yards occupy large areas with equipment including lifts and cranes, welding equipment, rolling mills, and sandblasting machinery. The location of these fabrication yards is directly tied to the availability of a large enough channel that would allow the towing of these bulky and long structures. The average bulkhead depth needed for water access to fabrication yards is 15-20 feet. A fabricator must also consider other physical limitations, such as the ability to clear bridges and navigate tight corners within channels. Thus, platform fabrication yards must be located at deep-draft seaports or along the wider and deeper of the inland channels.

Deepwater is considering fabrication sites on the Raritan River and Arthur Kill. Both Raritan River and Arthur Kill would be accessed by Raritan Bay, between the States of New York and New Jersey. Arthur Kill is a heavily used marine channel that provides access for ocean-going container ships to Port

Newark and to industrial facilities along the channel itself. Deepwater has proposed using Atlantic City, New Jersey as a staging area.

Bluewater has proposed the Port of Wilmington, Delaware as the fabrication site and staging area for construction and installation for its proposals off of Delaware and New Jersey. Bluewater would also use the Delaware Bay Launch located in the town of Milford, Delaware and the Indian River Marina located in the town of Rehoboth Beach, Delaware as crew boat and/or small cargo barge launch sites to support construction and operation activities. The Port of Wilmington is an existing 308-acre onshore industrial site with access to port infrastructure including seven deepwater general cargo berths, a tanker berth, and a floating berth for roll-on roll-off (RoRo) container vessels on the Christina River, and an automobile and RoRo berth on the Delaware River. The Port of Wilmington is the busiest terminal on the Delaware River over 400 vessels per year (Port of Wilmington, 2009).

The FERN's application stated fabrication and staging would likely occur from existing docks and shipyard facilities in Dorchester, Atlantic City, and/or Cape May, New Jersey.

The meteorological tower would be manufactured at a commercial facility in sections, and then shipped by truck, rail, or sea to the onshore staging area. The meteorological tower would be partially assembled and loaded onto a barge for transport to the installation site. Finally assembly of the tower would be completed offshore.

3.1.3.4 Offshore Activity

During installation, a radius of about 1,500 feet (162 acres) around the site would be needed for the movement and anchoring of support vessels. A number of vessel trips to and from the onshore staging area would occur during installation. Depending on the type of structure installed and the weather and sea state conditions, installation of a meteorological tower would take about 8 days, but could take up to 10 weeks and may occur over multiple construction seasons.

The following sections describe the installation of the foundation structure and the tower.

Installation of the Foundation Structure

The jacket foundation and deck would be fabricated onshore then transferred to barge(s) and towed to the offshore site. This equipment would be deployed from two barges, one containing the pile driving equipment and a second containing a small crane, support equipment and the balance of materials needed to erect the platform deck. These barges would be tended by appropriate tugs and workboats as needed.

The foundation pile(s) for the fixed platform could range from either a single 10-foot (3-meter) diameter monopole to four 3-foot (0.9-meter) diameter piles. These piles would be driven about 25 to 100 feet (7.6 to 30.5 meters) below the seafloor with a piledriving hammer typically used in marine construction operations. When the pile driving is complete after approximately three days, the pile driver barge would be removed. In its place a jack-up barge equipped with a crane may be utilized to assist in the mounting of the platform decking, tower and instrumentation. Depending on the type of structure installed and the weather and sea state conditions, the in-water construction time of the foundation pilings and platform would be approximately a few days to six weeks.

Piles are usually driven into the substrate using one of two types of hammer: impact hammers and vibratory hammers. The type of hammer used depends on a variety of factors, including pile and substrate type. Impact hammers consist of a heavy weight that is repeatedly dropped onto the top of the pile, and can be used to drive all types of piles and substrates. Vibratory hammers utilize a combination of a stationary, heavy weight and vibration, and limited to softer, unconsolidated substrates such as sand and piles with a cutting edge (e.g., hollow steel pipe). Piles may be driven using a combination of vibratory and impact hammers. Overwater structures, such as the meteorological towers, must meet seismic stability criteria, requiring that the supporting piles are attached to, or driven into, the underlying hard material. In such cases, a vibratory hammer is often used to drive the pile through the overlying soft substrate, and the impact hammer is used to finish driving the pile to its final depth (Hanson et al., 2003).

The type and intensity of the sounds produced during pile driving depend on a variety of factors, including, but not limited to, the type and size of the pile, the firmness of the substrate into which the pile is being driven, the depth of water, and the type and size of the pile-driving hammer. Sound pressure levels are positively correlated with the size of the pile, as more energy is required to drive larger piles. Hollow steel piles, as small as 14-inch-diameter, have been shown to produce sound pressure levels that can injure fish (Reyff, 2003).

Driving hollow steel piles with impact hammers produce intense, sharp spikes of sound, while vibratory hammers produce continuous sound of lower intensity. When compared to impact hammers, the sounds produced by vibratory hammers are of longer duration (minutes vs. msec) and have more energy in the lower frequencies (15-26 Hz vs 100-800 Hz) (Würsig, et al. 2000; Carlson et al. 2001). Impact hammers, however, produce such short spikes of sound with little energy in the infrasound range (Carlson et al. 2001). Impact hammers produce more intense pressure waves than vibratory hammers.

Installation of the Mast

Final assembly of the tower would likely be completed at the offshore site, and the mast sections would be raised using a separate barge mounted crane. Deepwater has indicated in their application the possibility that a heavy duty, air-crane helicopter would be utilized to install the mast sections onto the foundation structures. If used a helicopter would make approximately four round trips from Atlantic City, New Jersey to each of Deepwater's two proposed offshore locations.

Vessel Traffic

Several vessels would be involved with construction of the proposed meteorological tower (see Table 3-1). Up to about 40 round trips by various vessels are expected during construction of each meteorological tower. A total of 280 round trips are expected as a result of installing all seven proposed meteorological towers, however these vessel trips estimated to occur as a result of construction may be spread over multiple construction seasons due to delays caused by weather and sea state conditions, acquiring required federal permits, and availability of vessels, workers, and tower components.

Table 3-1. Projected Vessel Usage and Specifications for the Construction of a Meteorological Tower

Vessel Type	Round Trips	Hours on Site	Length (feet)	Displacement (tons)	Engines (hp)	Fuel Capacity (gallons)
Crane barge	2	232	150-250	1,150	0	500
Deck cargo	2	232	150-270	750	0	0
Small cargo barge	2	232	90	154	0	0
Crew boat	21	54	51-57	100	1,000	1,800
Small tug boat	4	54	65	300	2,000	14,000
Large tug boat	8	108	95	1,300	4,200	20,000

3.1.4 Operation and Maintenance Activities

Depending on the duration of site assessment, the MMS's review of the Project Plan, and construction, the proposed structure would likely be present for 2 to 5 years. However, the lessee may submit a request for an extension of the lease term to MMS between 30 and 90 days prior to the expiration of the lease. Any request must demonstrate to MMS's satisfaction that lessee reasonably needs more time to conduct wind resource data collection activities.

3.1.4.1 Vessel Traffic

During this period data would be monitored and processed remotely relieving the need of cables to shore. The structure and instrumentation would be accessed by boat for routine maintenance. Monthly vessel trips due to operation and maintenance over the 2-5 year life of a meteorological tower are expected for a total of 24-60 round trips. Seven meteorological towers would result in a total of 168-420 round trips. These vessel trips would not require any addition to, or expansion of, onshore facilities. If a generator is used to power lighting and equipment, a maintenance vessel would make a trip at least once every other week, if not weekly to provide fuel, change oil and perform maintenance. It is projected that crew boats 51-57 feet in length with 400-1,000 horsepower (hp) engines and 1,800 gallon fuel capacity would be used to service the structure. The use of helicopters to transport personnel or supplies during operation and maintenance is not anticipated.

Vessel Operational Wastes

Operational waste generated from service vessels includes bilge and ballast waters, trash and debris, and sanitary and domestic wastes.

Bilge water is water that collects in the lower part of a ship. The bilge water is often contaminated by oil that leaks from the machinery within the vessel. The discharge of any oil or oily mixtures is prohibited under 33 CFR 151.10; however, discharges may occur in waters greater than 12 nautical miles from shore if the oil concentration is less than 100 parts per million (ppm). Discharges may occur within 12 nautical miles, if the concentration is less than 15 ppm.

Ballast water is used to maintain stability of the vessel and may be pumped from coastal or marine waters. Generally, the ballast water is pumped into and out of separate compartments and is not usually contaminated with oil; however, the same discharge criteria apply as for bilge water (33 CFR 151.10). The discharge of trash and debris is prohibited (33 CFR 151.51-77) unless it is passed through a comminutor and can pass through a 25-mm mesh screen. All other trash and debris must be returned to shore for proper disposal with municipal and solid waste. Ballast water may be subject to the USCG Ballast Water Management Program to prevent the spread of aquatic nuisance species (69 *FR* 113, p. 32,869).

All vessels with toilet facilities must have a marine sanitation device (MSD) that complies with 40 CFR 140 and 33 CFR 149. Vessels complying with 33 CFR 159 are not subject to State and local MSD requirements. A Type II MSD macerates waste solids so that the discharge contains no suspended particles and the bacteria count must be below 200 per 100 milliliters. Type III MSDs are holding tanks and are the most common type of MSD found on boats. These systems are designed to retain or treat the waste until it can be disposed of at the proper shoreside facilities. State and local governments regulate domestic or gray water discharges. However, a State may prohibit the discharge of all sewage within any or all of its waters. Domestic waste consists of all types of wastes generated in the living spaces on board a ship including gray water that is generated from dishwasher, shower, laundry, bath and washbasin drains. Gray water from vessels is not regulated offshore. Gray water should not be processed through the MSD, which is specifically designed to handle sewage.

3.1.4.2 Visual Aesthetics

Six of the seven proposed meteorological towers would be located at least 15 miles from shore. The widest portion of these structures, their decks, would be located below the visual horizon and not visible from shore. While the tallest portions of the masts would be above the visual horizon, they would be too narrow (3-5 meters) to be visible from shore. Only under ideal conditions, it is possible that one of the seven proposed meteorological towers would be visible from a stretch of developed shoreline between Ocean City and Atlantic City, New Jersey. While proposed lease Block 6931 is at least eight miles from shore, FERN's proposed location within the lease block is at least 9.5 miles from shore. At this distance and because of the width of the proposed structure, a meteorological tower located in Block 6931 would be virtually invisible from shore.

3.1.4.3 Other Uses

The platform may also be used to conduct avian and marine mammal studies. Bluewater has proposed an avian radar system that would be operating continuously. A thermal imaging camera – vertically pointing radar (TI-VPR) would be operated remotely by a combination of wireless links and pre-set start-up and shut-down intervals (e.g., 8 hours followed by 12 hours off). The Anabat system could also be set to operate on any cycle required and may be connected to temperature, wind, and rain sensors for shut-down during bad weather.

It is expected similar monitoring equipment would be used on the other proposed meteorological towers. Both FERN and Deepwater's applications state the proposed platforms would accommodate environmental monitoring equipment, such as avian radar. The FERN application states this equipment "will be determined in conjunction with New Jersey Department of Environmental Protection (NJDEP), which is conducting Baseline Environmental Studies in the area," and makes the data "available for and coordinate with the NJDEP to augment the studies being conducted by the NJDEP."

3.1.5 Decommissioning

Within a period of one year after cancellation, expiration, relinquishment, or other termination of the lease, the lessee would be required to remove all devices, works and structures from the leased area and restore the leased area to its original condition before issuance of the lease. It is estimated that the entire removal process would take one week or less.

Decommissioning activities would begin with the removal of all meteorological instrumentation from the tower. A derrick barge would be transported to the offshore site and anchored adjacent to the structure. The mast would be removed from the deck and loading onto the transport barge. The deck would be cut from the foundation structure and loaded on the transport barge. The sea bottom area beneath installed structures must be cleared of all materials that have been introduced to the area in support of the lessee's project.

3.1.5.1 Cutting and Removing Piles

As required by the lease, the lessee would sever bottom-founded structures and their related components at least 5 meters (15 feet) below the mudline to ensure that nothing would be exposed that could interfere with future lessees and other activities in the area. Piles of fixed structures would likely be cut from the inside of the pilings with non-explosive methods. The MMS prepared a programmatic EA, *Structure-Removal Operations on the Gulf of Mexico Outer Continental Shelf* (USDOI, MMS, 2005), to evaluate the full range of potential environmental impacts of structure-removal activities in detail, including the various technologies that could be used.

The MMS assumes the meteorological towers proposed off of Delaware and New Jersey can be removed using non-explosive severing methods. The issuance of a lease would not constitute the approval of explosive severing methods; however, if a lessee intends to use explosive severing methods then a detailed Decommissioning Plan, in addition to any other requirements of the lease, must be submitted to MMS for approval. Proposed use of explosives may require supplemental NEPA analysis and re-initiation of relevant consultations.

Common non-explosive severing tools that may be used consist of abrasive cutters (e.g., sand cutters and abrasive water jets), mechanical (carbide) cutters, diver cutting (e.g., underwater arc cutters and the oxyacetylene/oxyhydrogen torches), and diamond wire cutters. Of these the most likely would be an internal cutting tool, such as a high pressure water jet-cutting tool. In order to cut a pile internally, the sand that had been forced into the hollow pile during installation would be removed by hydraulic dredging/pumping, and stored on a barge. Once cut, the steel pile would then be lifted on to a barge, and transported to shore. Following the removal of the cut pile and the adjacent scour control system, the sediments would be returned to the excavated pile site using a vacuum pump and diver assisted hoses. No excavation around the outside of the monopole or piles prior to the cutting is anticipated. Cutting and

removing piles would take anywhere from several hours to one day per pile. After the foundation is severed, it would be lifted on the transport barge and towed to the decommissioning site.

3.1.5.2 Removal of Scour Control System

During decommissioning, the scour control system would also be removed. Scour mats would be removed by divers or ROV, and a support vessel in a similar manner to installation. Removal is expected to result in greater amounts of suspended sediments than levels associated with the original installation of the mats. It is anticipated that the sandy nature of the bottom material over most of the proposed lease blocks would result in rapid settling of the suspended sediment material. If rock armoring is used, armor stones would be removed using a clamshell dredge or similar equipment and placed on a barge. It is estimated that the removal of the scour control system would take a half day per pile, therefore depending on the foundation structure removal of the scour system would take a total of 0.5 to 2 days to remove the scour control system around a meteorological tower.

3.1.5.3 Disposal

All materials would be removed by barge and transported to shore. The steel would be recycled and remaining materials would be disposed of in existing landfills in accordance with applicable regulations.

3.1.5.4 Artificial Reefs

The use of obsolete materials as artificial reefs have been used along the coastline of the United States to provide valuable habitat for numerous species of fish in areas devoid of natural hard bottom. The proposed structures may also have the potential to serve as artificial reefs. The structure must not pose an unreasonable impediment to future development. The reuse Rigs-to-Reefs plan must comply with the artificial reef permitting requirements of the USACE and the criteria in the National Artificial Reef Plan. States in the North East and Mid Atlantic regions have artificial reef programs. The State agency responsible for managing marine fisheries resources must accept liability for the structure before the MMS would release the Federal lessee from obligations in the lease instrument. No artificial reef sites are located within the proposed lease areas.

3.1.5.5 Vessel Traffic

Vessel usage during decommissioning would be similar to vessel usage during construction. Up to about 40 round trips by various vessels are expected during decommissioning of each meteorological tower. A total of 280 round trips are expected as a result of decommissioning all seven proposed meteorological towers.

3.2 Non-Routine Events

Chapter 5.2.24 of the Programmatic EIS discusses in detail potential non-routine events and hazards that could during data collection activities. The primary events and hazards are: (1) occupational hazards similar to those of most large industrial facilities and infrastructure projects, (2) collisions between the proposed structure or associated vessels with other marine vessels or marine life, and (3) spills from collisions or during generator refueling. These events and hazards are summarized below.

3.2.1 Occupational Hazards

Two of the primary occupational hazards include working at heights and working on or over water. Working at heights and over water may be required during construction or maintenance. Working at heights can pose a significant risk from falls. In addition, risks are also associated with the use of cranes that are often necessary to support working at heights. Working on or over water can pose a risk of drowning, and requires the additional consideration of wind and weather, the availability of buoyancy

devices, and qualified boat and rescue personnel. Industrial accidents could result in both worker injuries and fatalities.

Safety hazards related to the use of a helicopter during installation of a mast include static charge and rotor wash. During flight a static charge builds up due to the rotating blades of the helicopter, and the mast sections that are lowered from the helicopter should be grounded before workers come in contact with them to avoid electric shock. Rotor wash is the high velocity winds under a hovering helicopter, which could make it difficult for construction crew on the platform and nearby barges to walk or stand, and move unsecured material safely. Deepwater proposes using a S64F Erickson air crane helicopter, which is equipped with an anti-rotation rigging system designed to keep the load from twisting or swinging from effects of the helicopter rotor wash (Erickson Air-Crane Corporation, 2009).

3.2.2 Vessel Collisions

A meteorological tower located on the OCS could potentially cause a navigational risk to marine vessels and marine life, and have economic, safety, and environmental consequences. Though unlikely, a collision between a ship and a meteorological tower could result in the loss of the entire facility, as well as loss of life and spill of diesel fuel. A collision with marine life, such as a whale, could result in injury to the animal and/or damage to the facility. However, since these are fixed platforms, the MMS anticipates that marine life can sense the presence of fixed structures and would avoid colliding with them.

Vessel traffic in the vicinity of the proposed lease areas is discussed in Chapter 3.3.2 of this EA. Safety fairways, traffic separation schemes, and anchorages are the most effective means of preventing vessel collisions with OCS structures. A meteorological tower would not be permitted within these areas. Vessels associated with site assessment surveys, or construction, maintenance or decommissioning of the meteorological tower could collide with marine mammals, turtles, and other marine animals during transit. To limit or prevent such collisions, NOAA Fisheries Service provides all boat operators with “Whalewatching Guidelines,” which is derived from the Marine Mammal Protection Act. These guidelines suggest safe navigational practices based on speed and distance limitations when encountering marine mammals. The frequency of vessel collisions with marine mammals, turtles, or other marine animals probably varies as a function of spatial and temporal distribution patterns of the living resources, the pathways of maritime traffic (coastal traffic is more predictable than offshore traffic), and as a function of vessel speed, the number of vessel trips, and the navigational visibility.

3.2.3 Spills

Vessels are expected to comply with USCG requirements relating to prevention and control of oil spills. If a vessel collision occurs and if the collision leads to major hull damages a diesel spill could occur. Approximately 10 percent of vessel collisions with oil and gas platforms on the OCS caused diesel spills. From 2000 to 2004, the average tow and tugboat diesel fuel spill size was 30 to 150 gallons (USCG, 2003). Generators may be used to power equipment and lights on the meteorological towers, and diesel fuel spills may also occur during refueling of these generators.

Diesel fuel is a refined petroleum product that is lighter than water. It may float on the water’s surface or be dispersed into the water column by waves. If a diesel spill were to occur, it would be expected to dissipate very rapidly. Since diesel is light it would evaporate and biodegrade within a few days.

3.3 Space Use Conflicts

The proposed meteorological towers could pose a space use conflict with existing and future activities including military training, marine transportation, other renewable energy projects, and fishing. These activities are discussed below with the exception of commercial and recreational fishing which is discussed in Chapter 4.1.3.6 of this EA.

3.3.1 Military Use Areas

Chapter 4.2.16 of the Programmatic EIS discusses the numerous military use areas off the Atlantic Coast where the U.S. Air Force, Navy, Marine Corps, and Special Operations Forces conduct various testing and training missions. The proposed lease blocks, except for Block 6931, are located in naval operational areas, which are offshore areas where the Navy conducts training exercises (see Figure 3-4).

The Virginia Capes Operational Area is located off the Virginia and North Carolina coasts. Block 6325 is located in Warning Area 386 (W-386). The W-386 may be used for air-to-air, air-to-surface, surface-to-air, and surface-to-surface missile exercises, gunnery exercises, and rocket exercises using conventional ordnance. When W-386's airspace is not in use for military activities it may be released to the Federal Aviation Administration (FAA) (U.S. Dept. of the Navy, 2008).

The Atlantic City Operational Area is located off the New Jersey and New York coasts. Blocks 6451, 6738, 6936, 7033, and 7131 are located in W-107. The W-107 is used for surface-to-air gunnery exercises using conventional ordnance and exercises. Subsurface operations are not scheduled in this area (GlobalSecurity.org, 2009).

The MMS consulted with the Navy on the proposed action addressed in this EA. On September 10, 2008, the Navy responded that the impact to the Navy's training areas from the construction of meteorological towers off the coasts of Delaware and New Jersey is negligible (Egeland, personal communication, 2008).

3.3.2 Transportation

Chapter 4.2.17 of the Programmatic EIS discusses vessel traffic along the North Atlantic coast. Chapter 5.2.17 of the Programmatic EIS discusses the impacts that site characterization could have on marine traffic.

There are many major ports in the vicinity of the proposed lease areas. Vessels using these ports include military, commercial, recreational, and research vessels. Chapter 3.1.3.3 of this EA discusses the ports that would support the proposed action.

The relatively small number of trips projected as result of the proposed action is not expected to interfere with navigation. This number of trips is small compared to millions of commercial and recreational vessel trips projected to occur during the same period. This estimation is based on the following information. In 2007, about three-quarters of a million recreational fishing trips were made to the Federal waters offshore Delaware and New Jersey (USDOC, NOAA Fisheries, Office of Science and Technology, 2009a). "The Delaware Bay is home to the world's largest freshwater port and a strategic national port. The port receives over 3000 commercial vessel arrivals annually carrying over 78 million metric tons of cargo worth over \$47 billion. This steadily increasing trend in vessel traffic is projected to double by 2020" (Marriott and Frantz, 2008). Port Newark/Elizabeth accommodates 3,700 vessels annually (The Port Authority of NY/NJ, 2008). A total of 5,043 commercial fishing trips were taken in Delaware during 2000, with most occurring in April (Whitmore, 2001).

Commercial shipping in the area of the proposed leases is managed by traffic separation schemes and precautionary areas designated by 33 CFR 167 (see Figure 3-4). The proposed lease areas are located outside of these areas. However, ships frequently anchor in the vicinity of the proposed lease areas, outside of designated anchorage areas, while waiting to go to port. This occurs particularly offshore of Delaware Bay (USCG, personal communication, 2008).

The MMS has consulted with both the USCG and FAA on the proposed meteorological towers and associated activity. Though the meteorological towers are not located within designated traffic zones, they may still pose a minor obstruction to navigation and would be mitigated by USCG required lighting, if required. In addition, mariners would be notified of the presence of these meteorological towers via a Notice to Mariners, and their locations would be marked on new charts. The meteorological towers would be considered Private Aids to Navigation, which are regulated by the USCG under 33 CFR 66. It is the lessee's responsibility to submit an application for a Private Aid to Navigation to the USCG prior to construction.

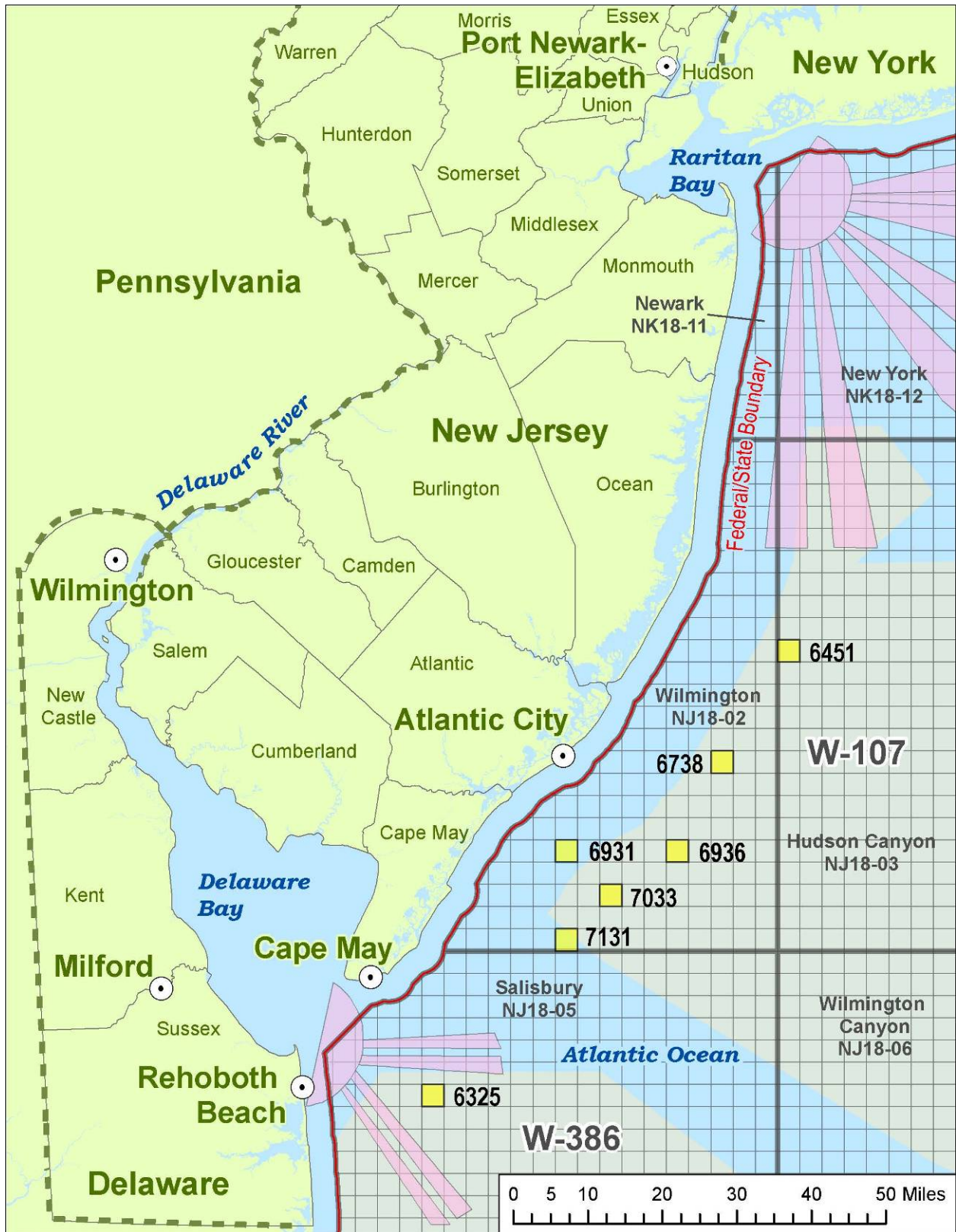


Figure 3-4. Location of the proposed lease areas, fairways, and military warning areas.

On January 15, 2009, the MMS consulted with FAA regarding the requirements to which the proposed lessees would be subject. Because the proposed meteorological towers would be taller than 200 feet, each lessee would be required to file a “Notice of Proposed Construction or Alteration” with the FAA per federal aviation regulations (14 CFR 77.13). According to the FAA, specific mitigation measures, including lighting requirements, would be applied on a case by case basis (Baron, personal communication, 2009).

3.3.3 Other Renewable Energy Projects

Wind Energy

In the draft proposed *Outer Continental Shelf Oil and Gas Leasing Program: 2010-2015* (USDO, MMS, 2009), the MMS identified preliminary priority leasing areas for the next five years, as well as areas of tentative interest for future renewable energy activity. These areas included areas located off the coasts of New Jersey and Delaware.

New Jersey

In October 2008, the State of New Jersey selected Garden State Offshore Energy LLC (GSOE) as the winner of the grant solicitation to develop a capacity of up to 350 megawatts of wind power off its coast. Therefore, the MMS anticipated offering a commercial OCS wind energy lease as early as 2011 off the coast of New Jersey, after completing the necessary competitive or noncompetitive leasing process and accompanying reviews, such as those required by NEPA and CZMA.

Delaware

A wind energy development project has been proposed with the support of the State of Delaware. The developer, Bluewater, has entered into a power purchase agreement with the local utility, Delmarva Power, calling for construction of an OCS wind power facility delivering at maximum 200 megawatts per hour of power. Under this contract the developer needs to obtain the permits for construction and operation of the project by August 2012. The MMS plans to offer a wind energy lease by that date after completing the necessary competitive or non-competitive leasing process and accompanying reviews, such as those required by NEPA and CZMA.

Wave Energy

On October 22, 2008, Grays Harbor Ocean Energy Company LLC (Grays Harbor) applied for a preliminary permit for a wave energy projects off the coasts of New Jersey (Eber, 2008). On November 28, Federal Energy Regulatory Commission (FERC) accepted the applications for filing and initiated a 60-day public comment period. Grays Harbor proposes to install 100 wave energy converters (WEC's) in a 280 square mile area located 12-25 miles east of Atlantic City, New Jersey (Grays Harbor, 2008). Buried transmission lines would run between the WEC's to an offshore substation, and a larger cable would be installed to shore. Though Grays Harbor's proposed site overlaps with three of the proposed lease areas (Blocks 6936 7033, and 7131) addressed in this EA, only a portion of the area would be occupied by the WEC array. On January 27, 2009, the MMS filed a Protest³ and, together with USFWS, a Notice of Intervention in this proceeding.

³ See, Protest of the United States Minerals Management Service (FERC Dockets: P-13306; P-13307; P-13308; P-13309; P-13310; P-13311; and, P-13312).

4 ENVIRONMENTAL AND SOCIOECONOMIC CONSEQUENCES

4.1 *The Proposed Action*

4.1.1 Physical Resources

4.1.1.1 Air Quality

Chapter 4.2.2.2 of the Programmatic EIS describes air quality in the Atlantic Region, while Chapter 4.2.2.3 describes regulatory controls on OCS activities that affect air quality. The following is a summary of that information, and incorporates new and site-specific information.

4.1.1.1.1 Description of the Affected Environment

The Clean Air Act (CAA) of 1970 directed the U.S. Environmental Protection Agency (USEPA) to establish National Ambient Air Quality Standards (NAAQS) for air pollutants that are listed as “criteria” pollutants because there was adequate reason to believe that their presence in the ambient air “may reasonably be anticipated to endanger public health and welfare.” The NAAQS apply to sulfur dioxide (SO₂), nitrogen dioxide (NO₂), carbon monoxide (CO), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}), and lead (Pb) (40 CFR Part 50). The primary standards are set at levels to protect public health with an adequate margin of safety. The USEPA has designated secondary standards to protect public welfare. All of the standards are expressed as concentration in air and duration of exposure. Many standards address both short- and long-term exposures. Any individual State may adopt a more stringent set of standards.

When the monitored pollutant levels in an area exceed the NAAQS for any pollutant, the area is classified as “nonattainment” for that pollutant. None of the Delaware or New Jersey counties are subject to the 1-hour ozone standard, and all counties meet the NAAQS for NO₂, and Pb (USEPA, 2008a). Effective August 2008, Warren County, New Jersey is classified as nonattainment for SO₂. New Castle County, Delaware and six New Jersey counties (Burlington, Essex, Hudson, Middlesex, Monmouth, and Union Counties) are classified nonattainment for PM_{2.5}. All three Delaware counties and all 21 New Jersey counties are classified as nonattainment for ozone (8-hour). The USEPA air quality standards for ozone are 0.12 ppm (1-hour average) and 0.075 ppm (8-hour average). Ozone is a regional air pollutant issue. Prevailing southwest to west winds carry air pollution from the Ohio River Valley, where major nitrogen oxides (NO_x) emission sources (e.g., power plants) are located, and from mid-Atlantic metropolitan areas, to the northeast, contributing to high-ozone episodes.

Delaware’s 2006 annual air quality report (DNREC, 2006), which documents the changes and overall improvement in ambient air quality in the State. Over the last ten years, trends in ambient concentrations of the criteria pollutants have been either level or declining.

The USEPA General Conformity Rule (58 FR 63214, November 30, 1993) implements section 176(c) of the Clean Air Act and requires that Federal actions resulting in emissions in non-attainment areas and maintenance areas conform to the federally approved State implementation plan (SIP).

Class I Areas

Class I Areas are defined in Sections 101(b)(1), 169A(a)(2), and 301(a) of the CAA, as amended [42 USC 7401(b), 7410, 7491(a)(2), and 7601(a)]. Class I areas are federally owned lands where very little air quality degradation is allowed. In addition, air quality-related values including visibility are protected. Class I Areas have stringent incremental limits for NO₂, SO₂ and PM₁₀. The Prevention of Significant Deterioration (PSD) regulations (40 CFR 52.21 et seq.), which are designed to protect ambient air quality, apply to major new sources and major modifications to existing sources located in an attainment or unclassified area. Only one Class I Area is located within 200 kilometers (124 miles) of the proposed

leases. The proposed leases are located 24-82 kilometers (15-51 miles) from the Brigantine Wilderness Area.

Regulatory Controls on OCS Activities That Affect Air Quality

Section 328 of the Clean Air Act Amendments of 1990 (CAAA 1990) directs the establishment of regulations by USEPA for OCS sources ensuring attainment and maintenance of Federal and State ambient air quality standards in the corresponding onshore areas (COAs) and equitable treatment of onshore and OCS sources (42 U.S.C. 7627). The regulations are found in 40 CFR Part 55. Under Section 328, USEPA would have authority over the activities that would be authorized by the proposed action. Under the USEPA rules, for all OCS sources located within 25 miles of States' seaward boundaries, the requirements are the same as the requirements that would be applicable if the source were located in the COA. In States affected by this rule, State boundaries extend 3 nautical miles from the coastline.

Section 328 of the CAAA 1990 also establishes procedures for USEPA to delegate implementation and enforcement of its OCS requirements to State and local agencies for all activities occurring on the OCS within 25 mi of the States' seaward boundaries.

Section 328 of the CAAA 1990 also establishes a unique treatment for vessels associated with OCS facilities. With respect to calculations of the facility's Potential to Emit (PTE), emissions from vessels that are servicing or associated with the operations of OCS facilities must be counted as direct emissions from the OCS source when those vessels are at the source or en route to or from the source when within 25 nautical miles of the source. The USEPA rules set forth in 40 CFR Part 55 replicate this treatment of vessels with respect to PTE calculations.

The installation of a meteorological tower on the OCS may be subject to the rules set forth in 40 CFR Part 55. Any permit that may be needed by these regulations would be issued by the appropriate EPA Region (Region 2 for New Jersey and Region 3 for Delaware).

Some activities associated with OCS sources may require compliance with the General Conformity Rule 40 CFR Part 93, Subpart B. These regulations implemented Section 176 of CAAA 1990 which requires that Federal actions conform to applicable SIPs developed by States and approved by USEPA for the purpose of attaining or maintaining compliance with NAAQS. To determine whether a conformity determination is required, the Federal agency conducts an applicability analysis to identify, analyze, and quantify emissions resulting from an action. A conformity determination is required when the total direct and indirect emissions for criteria pollutants in a nonattainment or maintenance area exceed rates (known as *de minimus* rates), specified in 40 CFR 93.153(b)(1) and (2). The emissions estimates must include emissions from transportation of materials, equipment, and personnel, and must extend to construction and decommissioning phases, as well as the operational phase of the action. Conformity only applies to emissions within State boundaries and only to emissions that are not subject to an air permit. Emissions associated with the installation of the proposed meteorological towers on the OCS would not be large enough to trigger a conformity determination.

4.1.1.1.2 Impact Analysis of the Proposed Action

Impacts of Routine Activities

Routine activities associated with the proposed leases have the potential to impact air quality. Potential emission sources include support vessels during all phases, operation of cranes during construction and decommissioning phases, and the possible use of diesel generators during the operation phase.

Chapter 5.2.2.2 of the Programmatic EIS concluded that primary emission sources associated with site characterization activities would be from engine exhaust of vessel traffic (e.g., boat or barge) and heavy equipment (e.g., pile drivers). In general, most criteria pollutant emissions would be from internal combustion engines burning diesel fuel and would include primarily NO_x and carbon monoxide (CO), lesser amounts of volatile organic compounds (VOCs) and PM₁₀ (mostly in the form of PM_{2.5}), and

negligible amounts of sulfur oxides (SO_x). Moderate activity levels would last several weeks, such as during the construction or decommissioning of a meteorological tower, but potential air emissions would be negligible during the meteorological data collection period. Air emissions from construction and decommissioning of a meteorological tower during site characterization would be measurable and of short duration (several weeks at most), and accordingly, potential impacts on ambient air quality would be minor.

Site Assessment Surveys

The G&G EA concluded ships and aircraft involved in G&G surveys would produce air pollutant emissions; however, impacts on air quality are negligible (Continental Shelf Associates, 2004).

Construction and Decommissioning

Due to the short duration of construction and decommissioning, potential impacts on ambient air quality would be minor. Total emission of criteria air pollutants from construction of all seven proposed meteorological towers would be minor (less than 100 tons). Air quality analyses performed by Bluewater and Deepwater estimated that construction of a meteorological tower would generate 385.2-389.8 tons of CO₂. Similar emission levels would be expected again during decommissioning. *Structure-Removal Operations on the Gulf of Mexico Outer Continental Shelf* (USDOJ, MMS, 2005), concluded “the emission rates for the various air pollutants are well below the NAAQS and the MMS exemption levels. Therefore, the potential impacts of the proposed action...on air quality are not expected to be significant”.

Operations

Under the proposed action, seven meteorological towers would be operating concurrently during a 2- to 5-year period. The operation phase is estimated to contribute less than 100 tons per year of all criteria pollutants per meteorological tower.

Equipment on the meteorological tower would be powered by batteries charged by small wind turbines, solar panels, and/or diesel generators. While turbines and solar panels would produce no emissions, diesel generators would be considered a fixed emission source by USEPA. However, due to the distance to shore, the use of diesel generators would not impact onshore air quality including the Brigantine Class I Area.

Due to the distance from shore air emissions at the meteorological tower are not expected to impact onshore air quality. However support vessels traveling to and from shore have the potential to affect onshore air quality. Several major ports exist near the proposed leases that are suitable to support the fabrication and staging of meteorological towers. These ports include the Port of New York and New Jersey, Atlantic City, and industrial ports accessible via the Delaware Bay and Delaware River in New Jersey, Delaware, and Pennsylvania (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004). Support vessels travel from these ports and offshore sites would contribute slightly to emissions.

Impacts of Non-Routine Activities

Though unlikely, a spill of diesel fuel could occur from vessel collisions or during generator refueling. If a diesel spill were to occur, it would be expected to dissipate very rapidly. Since diesel is light it would evaporate and biodegrade within a few days. A diesel spill is not projected to have significant impacts on onshore air quality because of the prevailing atmospheric conditions, emissions height, emission rates, and the distance of these emissions from the coastline. Emissions from a diesel spill are not expected to have concentrations that would change onshore air quality classifications.

Conclusion

Due to the short duration or low level of emissions from routine activities, potential impacts on ambient air quality from the proposed would be negligible to minor. A non-routine event such as a diesel spill would have short-term, minor impacts on ambient air quality. Due to the distance from shore,

neither routine activities nor non-routine events would impact onshore air quality including the Brigantine Class I Area.

4.1.1.2 Water Quality

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

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

The region under consideration is divided into coastal and marine waters for the following discussion. Coastal waters, as defined by MMS, include all the bays and estuaries from the Raritan Bay, New York to Rehoboth Bay, Delaware. Marine water as defined in this document includes both State offshore water and Federal OCS waters, which includes everything outside any barrier islands to the Exclusive Economic Zone.

4.1.1.2.1 Description of the Affected Environment

Chapter 4.2.4 of the Programmatic EIS describes coastal and marine water quality in the Atlantic Region. The following is a summary of that information, and incorporates new and site-specific information.

Delaware Coastal Waters

The nation's coastal waters were rated using an index based on dissolved oxygen, chlorophyll *a*, nitrogen, phosphorus, and water clarity. The Northeast coast of the United States, Maine through Maryland, was rated fair to poor. Some tributaries of Delaware Bay and the Delaware River were rated poor (USEPA, 2008b).

The Delaware River Estuary extends as far inland as Trenton, New Jersey and passes through the urban and industrialized areas of Philadelphia, Pennsylvania, Wilmington, Delaware and Camden, New Jersey. These cities have been home to over a century of industrial activity and sediments retain historic contaminants from WWII-related and earlier industrial activities. The watershed currently is home to about 5 million people and supports major refineries, petrochemical plants and shipping. Philadelphia is the second largest tanker port in the United States. The urban areas contribute to water quality degradation from municipal waste water discharge, non-point source run-off and aging infrastructure.

Downriver from these urban areas agricultural land use dominates on both the New Jersey and Delaware sides of the Bay. Pollutants related to agriculture include elevated nutrients and suspended solids. *Pfiesteria* outbreaks in the late 1990s drew public attention to the needs to control agricultural run-off.

The State of the Delaware Estuary Report (2008) reports improved dissolved oxygen levels in the estuary since the 1980s, as a result of upgrades to wastewater treatment facilities. However, in the lower Bay the dissolved oxygen criterion continues to be exceeded. Levels of the contaminants mercury and chlorinated pesticides and PCBs are high enough in fish to require fish consumption advisories through the estuary. Nutrient levels have improved in the estuary since the start of monitoring.

Beach front communities dot the coast. The town of Rehoboth, Delaware attains a summer population of 75,000 people. Although these resort towns treat the municipal wastewater prior to discharge, in the case of Rehoboth, the back bay area, known as the Inland Bays watershed, to which the discharge is routed cannot meet state-specified dissolved oxygen levels. The Inland Bays watershed is impaired for nutrients Nitrogen and Phosphorus and bacteria. The town of Rehoboth must find new options for its treated waste water and is investigating ocean discharge as an option (The News Journal, 2008).

New Jersey Coastal Waters

New Jersey actively monitors coastal water quality and monitors shellfish and chlorophyll at a greater frequency and at more stations than the national survey. Dissolved oxygen is consistently rated good in New Jersey coastal waters. Water clarity is also good in New Jersey with the exception of some excessively turbid bays and estuaries. Major economic drivers are the beaches and tourism; and, New Jersey consistently tracks beach water quality related to elevated bacteria levels related to sewage or heavy rainfall. New Jersey also has statewide fish consumption advisories in coastal waters.

In the shallow estuaries of central New Jersey (Great Bay and Great Egg Harbor River) the annual dissolved oxygen concentration in annual summer monitoring has been in decline (Zimmer and Groppenbacher 1999). From 1990 – 1993 and 1993 - 1997 dissolved oxygen has been measured at below 4 mg/L, New Jersey's estuarine dissolved oxygen standard). The occurrence of these low DO concentrations coincided with phytoplankton blooms.

The Raritan Bay and/or Arthur Kill location in northern New Jersey has been listed as the fabrication site. The Arthur Kill links Raritan Bay to Newark Bay. The waters are impacted by industrial and municipal discharges, occasional spills from the many tank farms along Arthur Kill, and stormwater runoff. These waterways have been extensively used by industry and transportation for many years and the sediments reflect the impact of historical discharges. Although individual sampling locations may differ, in general the water quality in this region has been rated fair to poor due to elevated nitrogen and phosphorus and excessive turbidity (USEPA, 2008b).

Marine Waters

As the distance from shore increases, oceanic circulation increasingly serves to disperse and dilute anthropogenic contaminants and determine water quality. Offshore water quality in the marine areas of the proposed action are generally good as the region generally exhibits low water column stratification, low nutrient concentration, low chlorophyll populations, and good water quality measurements (USEPA, 1998). Since the vast majority of pollutants and threats to marine waters originate on land, there are far fewer identified major threats to marine water that are identified as actually originating from activities in the waters.

Presently sewage outfalls from both New Jersey and Delaware coastal discharge treated municipal waste water to the Atlantic Ocean. No ocean dredged material disposal sites are present in the vicinity of the proposed meteorological towers.

Mid-Atlantic ocean waters beyond three miles offshore typically have very low concentrations of suspended particles, generally less than 1 milligram per liter (Louis Berger Group, 1999). Levels may be higher in bottom waters because bottom currents may resuspend sand. Storms may cause suspended sediment loads to increase by one to two orders of magnitude, but this effect dissipates soon (within days) after the storm passes.

Dissolved oxygen is inversely related to temperature and, so, is generally highest in the winter and lowest in the summer. The State of New Jersey has been intermittently sampling state oceanic waters. While surface waters consistently have sufficient dissolved oxygen, the samples taken one foot off the bottom exhibited low dissolved oxygen during the summer months, especially in the more southern waters of the State. The cause remains under investigation but is probably due to a combination of

stratification and anthropogenic nutrients. It is expected that dissolved oxygen levels in bottom waters would range from about 3 to 10 milligrams per liter.

Dissolved nutrients in the vicinity of the proposed lease areas are likely to reflect conditions in the Mid-Atlantic Bight as a whole. While the Delaware Coastal Current may introduce nutrients, the distance from shore reduces the significance of that potential influence. Nutrients are high enough, however, to support high phytoplankton productivity (Louis Berger Group, 1999).

Discharges from ships and wastewater treatment facilities are the most likely sources of water-borne contaminants in the proposed lease areas. Sand, the predominant sediment type in the area, does not retain contaminants, thus resuspension of sediments is not a potential source. The distance of the proposed lease areas from the shoreline bays and rivers limits the potential influence of land-based contaminants.

4.1.1.2.2 Impact Analysis of the Proposed Action

Routine Activities

The routine activities associated with the proposed action that would impact coastal and marine water quality include nonpoint-source runoff from onshore facilities, vessel discharges including bilge and ballast water and sanitary waste, and structure installation and removal. A general description of these impacts to coastal and marine water quality is presented in Chapter 5.2.4 of the Programmatic EIS. The following is a summary of that information, and incorporates new and site-specific information.

Onshore Discharges

Supporting onshore facilities discharge into local wastewater treatment plants and waterways during routine activities. All point-source discharges are regulated by the USEPA, the agency responsible for coastal water quality, or the USEPA-authorized State agency. The USEPA National Pollutant Discharge Elimination System (NPDES) storm-water effluent limitation guidelines control storm-water discharges from support facilities. Indirect impacts could occur from nonpoint-source runoff, such as rainfall, which has drained from onshore sources, such as a public road and parking lot, and may contribute hydrocarbons, trace-metal pollutants and suspended sediments. Data are not available to make estimates of the impact from this type of discharge, however activities associated with site assessment surveys and construction, operation and decommissioning of the meteorological towers would account for a very small amount of activity at existing ports during short duration of staging.

Vessel Discharges

Vessel discharges may affect water quality during all phases of the proposed action. Vessel discharges include bilge and ballast water, and sanitary waste. Bilge water is often contaminated with oil. Regulations that set limits for oil in bilge water would minimize the impact to water quality. Ballast water is less likely to contain oil but is subject to the same limits. In coastal waters, bilge and ballast water may be discharged with an oil content of 15 ppm or less. The discharges would affect the water quality locally.

The marine sanitation device (MSD) is required to treat sanitary waste generated on the service vessel so that surrounding water would not be impacted by possible bacteria or viruses in the waste. The MSD Type III device, where waste water is tanked aboard ship until pumped out onshore, is the most common type of sewerage treatment system aboard vessels. The MSD Type II device requires that solids be ground up and chlorinated before discharge at sea. The discharge of treated sanitary waste would still contribute some small amount of nutrients to the water. A description of service-vessel operational wastes and regulations is provided in Chapter 3.1.4.1 of this EA.

The proposed meteorological towers are expected to be present for a short period, 2-5 years. During that period, approximately 128-140 round trips by vessels are projected to result from construction,

operation and decommissioning activities per meteorological tower. Less than 1,000 rounds trips are expected as a result of all seven proposed meteorological towers.

Sediment Disturbance

Sediment disturbance could result from vessel anchoring, G&G surveys, and structure installation and removal.

Anchoring

The process of anchoring the vessels and anchor removal would cause intermittent disturbance of the seafloor, with movement of sediment into the water column followed by sedimentation. The amount and duration of increased turbidity would be dependent upon the activity, the sediment grain size, current velocity, and water depth.

Geological and Geophysical Surveys

Site assessment surveys are likely to involve sediment coring, G&G surveys, and possibly ecological sampling. The geophysical surveys would not likely influence water quality, but sediment coring and ecological monitoring would cause temporary disturbance of the seafloor and introduction of sediment into the water column, temporary increased turbidity and sedimentation. To the extent that sediment samples are collected by well drilling equipment that uses drilling fluids, the disposition of the used drilling fluids and the sediment core material itself could cause short-term water quality impacts. Construction of the tower may create temporary and minor water and sediment impacts.

Installation and Decommissioning

Impacts to water quality resulting from the construction of meteorological towers would consist of sediment dispersal, resuspension and subsequent sedimentation from pile-driving. Water quality impacts would occur during decommissioning activities from material dislodged from the piles during removal, and sediment resuspension and resedimentation during the removal of the tower, foundation, and scour protection system. Decommissioning would involve complete removal of the structure to 4.6 meters (15 feet) below the seafloor. Decommissioning is expected to take about one week per meteorological tower. Water quality impacts would be related to vessel discharges and sediment disturbance. When the structure is decommissioned, sediments that had collected in the scour control system, mats or rock armor, would be temporarily disturbed.

Non-Routine Events

During all phases of the proposed action, multiple sources of diesel fuel would be present including vessels, generators, and pile driving hammers. Though unlikely, spills could occur during refueling or as the result of a collision.

A vessel collision with the meteorological towers or other vessels may result in the spillage of diesel. Vessels are expected to comply with USCG requirements relating to prevention and control of oil spills. Approximately 10 percent of vessel collisions with fixed structures on the OCS caused diesel spills. A tugboat or towboat would be the vessel most likely to strike a meteorological tower. Nationally, tow and tugboats comprise about 5 to 10 percent of the oil spills reported annually to the USCG. From 2000 to 2004, the average tow and tugboat spill size was 30 to 150 gallons (USCG, 2003).

Diesel generators would be used during site assessment surveys, construction and decommissioning activities, and may be used during operation of the meteorological tower to power equipment and lights. In addition a diesel pile driving hammer would be used during construction.

If a diesel spill were to occur, it would be expected to dissipate very rapidly. Because diesel is light it would evaporate and biodegrade within a few days.

The meteorological towers could also serve as attractants for marine life, which in turn attracts recreational fishermen to the area. Therefore there is some potential for collisions with recreational fishing boats and accidental release of diesel fuel.

Conclusion

Impacts to coastal and marine waters from routine activities associated with the proposed action should be a short duration and remain minimal as long as regulatory requirements are followed. Minimal impacts would result from a spill since diesel is light and would evaporate and biodegrade within a few days. Since collisions occur infrequently, the potential impacts to water quality are not expected to be significant.

4.1.2 Biological Resources

4.1.2.1 Coastal Habitats

4.1.2.1.1 Description of the Affected Environment

The general description of coastal habitats along the Atlantic Coastal Plain are incorporated here by reference and can be found in Chapter 4.2.13 of the Programmatic EIS (USDOI, MMS, 2007). New Jersey has 127-mile long coastline along the Atlantic Ocean, 83 miles of shoreline along the Raritan and Delaware Bays, and over 300,000 acres of tidal wetlands (NJDEP, 2002 and 2008). Delaware has 24 miles of oceanfront coastline along the Atlantic Ocean and over 381 miles bordering various estuaries, including Delaware Bay (DNREC, 2009).

Delaware Bay

Delaware Bay coastal resources include extensive areas of tidal wetlands, mudflats and sandy beaches (Cole et al., 2005). Southern Delaware Bay is predominately lined with saline fringe, while northern Delaware Bay is predominately lined with (Adkins, 2008). The Bay is a critical staging area for migratory shorebird species, and every spring close to a million shorebirds descend on Delaware Bay before resuming their northward migrations. The most important factor for shorebirds migrating to the Delaware Bay is food supply, which includes horseshoe crabs. Delaware Bay is home to the world's largest spawning population of horseshoe crabs (Adkins, 2008).

Raritan Bay

The shoreline of Raritan Bay consists of 3,600 acres of shallow tidal mudflats, sandflats, and salt marsh. Many state listed species of birds forage along Raritan Bay during breeding season (New Jersey Audubon Society, 2009). Much of the upland and wetland shoreline of Raritan Bay and its associated watersheds have been developed, impaired, or degraded by industrial, commercial, and residential uses (USFWS, 2009).

4.1.2.1.2 Impact Analysis of the Proposed Action

The proposed leases would be located 8-17 miles from the nearest shoreline. Therefore, survey, construction, operation and decommissioning activities occurring within the proposed lease areas would have no impacts on coastal habitats. Only coastal vessel traffic and use of existing coastal facilities have the potential to impact coastal habitats as discussed below.

Routine Activities

Several existing fabrication sites, staging areas, and ports in Delaware and New Jersey would support survey, construction, operation and decommissioning activities as discussed in Chapter 3.1.3.3 of this EA. No expansion of these existing areas is anticipated in support of the proposed action. Existing channels

could accommodate the vessels anticipated to be used, and no additional dredging would be required as a result of the proposed action. In addition, no cables would be installed to shore from the proposed leases. Therefore, there would be no direct impact from routine activities on coastal habitats.

Indirect impacts from routine activities may occur from wake erosion caused by vessel traffic in support of the proposed action. About 1,000 vessel trips are projected to occur over a 5-year period as a result of the proposed action. These trips would be divided among several sites in Delaware and New Jersey adding a negligible increase to traffic in already heavily used waterways. Assuming approach channels to ports used would be armored and speed limits enforced, a negligible increase, if any, to wake induced erosion may occur.

Non-Routine Events

Though unlikely, a diesel fuel spill could occur in coastal waters as the result of a vessel collision, if the collision leads to major hull damages. Based on the size of the vessels anticipated to be used, the estimated size of a diesel fuel spill would be 30-150 gallons. Diesel fuel is a refined petroleum product that is lighter than water. It may float on the water's surface or be dispersed into the water column by waves. Diesel fuel can be degraded by naturally occurring microorganisms in one to two months, and would collect in sediments. Assuming compliance with USCG requirements relating to prevention and control of oil spills, potential impacts would be avoided or minimized.

Conclusion

No direct impacts on coastal habitats would occur from routine activities as a result of the proposed action due to the distance of the proposed leases from shore and the use of existing coastal facilities. Indirect impacts from routine activities may occur from wake erosion caused by vessel traffic in support of the proposed action. Assuming approach channels to ports used would be armored and speed limits enforced, a negligible increase, if any, to wake induced erosion may occur. Assuming compliance with USCG requirements relating to prevention and control of oil spills, potential impacts to coastal habitats from an accidental diesel fuel spill would be avoided or minimized.

4.1.2.2 Benthic Resources

4.1.2.2.1 Description of the Affected Environment

The proposed site assessment surveys, and construction, operation and decommissioning of seven meteorological towers range approximately 8-17 miles off the coasts of Delaware and New Jersey. Data from Williams et al. (2006) shows the region is predominately sand substrate with areas of finer silty sediments and patches of coarser gravel.

In 1998 and 1999, the MMS sampled bottom sediments on the inner shelf west of the ancestral Delaware canyon and a few miles landward of the proposed Delaware meteorological tower construction site (Cutter et al., 2000). The locations for the grab sampling were in two shoal areas dominated by sand ridges that are prospective locations for sand borrowing to provide sand for future beach nourishment. A southern tract near the border of Delaware and Maryland (Fenwick shoals) was sampled (52 samples) in 1998 and a northern tract (Indian River Inlet) was sampled in 1999 (20 samples) (Cutter et al., 2000, Figures 2.1-1 through 2.1-3 and 2.2-1).

The infaunal community at both sites was dominated by annelids, molluscs, and crustaceans (see Table 4-1) (Cutter et al., 2000, Table 4.2-2). In terms of biomass the communities were dominated by molluscs. Biomass at Fenwick Shoals was 87 percent bivalves, six percent polychaetes, three percent gastropods, one percent amphipods, and about three percent other taxa. Biomass at Indian River Inlet was 64 percent bivalves, 24 percent polychaetes, three percent gastropods, six percent amphipods, and about three percent other taxa (Cutter et al., 2000, Table 4.2-7).

Table 4-1. Percent composition of infauna at two sand borrow sites near the proposed action

Major Taxa	Fenwick Shoals		Indian River Inlet	
	May-98		Jun-99	
	% of Individuals	% of Taxa	% of Individuals	% of Taxa
Annelida	75.9	50.7	72.5	52.8
Mollusca	13.8	23	12	21.3
Crustacea	6.5	22.4	12.5	20.4
Anthozoa	0.3	0.7	0.3	0.9
Nemertinea	2.8	0.7	1.8	0.9
Sipuncula	0.1	0.7	0.02	0.9
Phoronida	0.3	0.7	0.4	0.9
Echinodermata	0.2	0.7	0.1	0.9
Cephalochordata	0.1	0.7	0.2	0.9

Source: (Cutter et al., 2000, Table 4.2-7).

Assessments of sand shoals off the coast of New Jersey by Byrnes et al. (2000) characterized the occurrence of sand ridges grading into clayey-silty mud. Sand ridges were occupied by very small ascidians (sea squirts) attached to sand grains and by burrowing amphipods. Neighboring swales supported structure-building infauna such as polychaete worms and tube-dwelling amphipods. Both communities seemed to vasculate readily with the shifting of sand features resulting from seasonal storm events.

Another study by Byrnes et al. (2004) indicated that infaunal distribution and abundance was correlated broadly with sediment grain size. Numerically dominant infaunal groups were crustaceans, echinoderms, mollusks, and polychaetes. Epifauna consisted of species typical for benthic assemblages in the study area, primarily decapods, sand dollars, and gastropods. Demersal fishes collected in trawls were consistent with previous surveys including the clearnose skate (*Raja eglanteria*), northern searobin (*Prionotus carolinus*), scup (*Stenotomus chrysops*), and summer flounder (*Paralichthys dentatus*). Squids were also collected in trawls. These species are the most ubiquitous and abundant demersal taxa in the region.

For a more complete description of the environment in the surrounding region, see the Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf (USDOJ, MMS, 2007).

4.1.2.2 Impact Analysis of the Proposed Action

Routine Activities

The main potential impacts on benthic communities would be direct contact that could cause crushing or smothering by anchors, the scour control system, or driven piles. It is anticipated that during installation, a radius of about 1,500 feet around each site would be needed for the movement and anchoring of support vessels. The bottom disturbance caused by installation of a fixed foundation would disturb a small area of sea bottom.

The area of ocean bottom affected by a meteorological tower would range from about a couple hundred square feet if supported by a monopole to a couple thousand square feet if supported by a jacket foundation. A scour control system, if used, would be comprised of installed rip rap or artificial seaweed mattresses affixed to the sea bottom by anchoring pins and would cover an area of approximately a 30-foot (9-meter) radius around the piling. The decision not to use scour control systems may be chosen because an area is not expected to be subject to scour or because expected scouring would not compromise the integrity of the structure. If scouring does occur, the area impacted can be expected to be

similar to or slightly larger than the projected area covered by a scour control system (30-foot [9-meter] radius beyond the structure). Upon decommissioning and removal the equivalent sea bottom area would be disturbed by severing the pile foundation legs at least 15 feet (4.5 meters) below the mudline. Pulling up the scour control system, if used, would disturb the same area disturbed when they were installed and would introduce a cloud of turbidity over approximately 0.50 AC of the sea bottom for each leg. Increased turbidity from the jack-down and move offsite for a jack-up barge platform would introduce a cloud of turbidity over approximately the same area for each leg. Re-suspended sediment might temporarily foul delicate filter feeding organs.

The soft-bottom community in the area of the proposed action is adapted to a sandy and mobile substrate. In order of individual abundance and biomass this soft-bottom community is dominated by polychaete worms, bivalves and amphipod crustaceans. Organisms in adjacent unaffected areas would be available to migrate into disturbed areas. The ability of soft-bottom communities to recover in number of individuals to pre-disturbance levels may take 1-3 years. Recovery of community composition or trophic structure that exploits all ecologic niches available may take longer (USDOJ, MMS, 2004, p. 73).

Impacts of site assessment surveys, and construction, operation, and removal of meteorological towers on benthic communities would be short-term in duration (8 days to 10 weeks for construction and ≤ 1 week for removal) and negligible in extent.

Non-Routine Events

Though unlikely, accidental spills of oils or diesel fuel during construction, operation, or decommissioning are possible. The potential that construction or maintenance vessels would have an accidental spill, most likely a fuel spill, is generally low. Benthic communities are unlikely to be affected by an accidental spill as such contaminants would remain at or near the surface. However, risks are slightly increased if the spill occurs during severe weather that could produce mixing of the hydrocarbons with water but this mixing typically does not extend below 20 feet (6 meters) depth. The most likely fluid to be spilled is diesel fuel, which is light and evaporates quickly. Such a spill would likely be restricted to the sea surface and would dissipate rapidly. Potential impacts are considered to be negligible.

Proposed Mitigation Measures

After the lease is issued and initial survey activities are conducted, the lessee may not commence construction activities until a project plan is submitted to and reviewed by MMS. According to the lease, the lessee's project plan must contain a description of environmental protection features or measures that lessee would use. For benthic communities, the MMS's primary mitigation strategy is avoidance. The exact location of meteorological towers would be adjusted to avoid adverse effects to sensitive benthic communities, if present. To ensure MMS receives adequate information to review a project plan the following stipulation is proposed.

If seafloor characteristics are identified that suggest the presence of biologically sensitive habitats near proposed lease activities, the proposed Biological Survey and Report Stipulation (see Appendix A.1) would require a biological survey of the sea bed must be conducted and a biological survey report prepared and submitted before conducting lease activities that would disturb the seafloor. Information indicating biologically sensitive habitats at specific locations may come from geophysical surveys, study of scientific literature, or any other source. Areas of suspected or observed biologically sensitive habitats must be targeted for site-specific surveys. These include areas where information suggests the presence of exposed hard bottoms of high, moderate, or low relief; hard bottoms covered by thin, ephemeral sand layers; rocky outcrops; surf clam habitat; scallop habitat; or seagrass patches.

A biological survey is designed to determine the presence and extent of biologically sensitive habitats near proposed lease activities. The proposed stipulation would provide guidelines for conducting surveys for biologically sensitive habitats and for preparing the survey report.

Conclusion

Impacts of site assessment surveys, and construction, operation, and removal of meteorological towers on benthic communities would be short-term in duration and negligible in extent. The main potential impacts from routine activities on benthic communities would be direct contact by anchors, driven piles, and scour protection that could cause crushing or smothering. If contact occurs, the ability of soft-bottom communities to recover in number of individuals to pre-disturbance levels may take 1-3 years. Recovery of community composition or trophic structure that exploits all ecologic niches available may take longer (USDOJ, MMS, 2004, p. 73).

Potential impacts from non-routine events, such as a diesel spill, are also considered to be negligible, because a diesel spill is unlikely and would likely be restricted to the sea surface and would dissipate rapidly if a spill were to occur.

For benthic communities, the MMS's primary mitigation strategy is avoidance. The exact location of meteorological towers would be adjusted to avoid adverse effects to sensitive benthic communities, if present.

4.1.2.3 Marine Mammals

4.1.2.3.1 Description of the Affected Environment

Several cetaceans, four pinnipeds, and one sirenian are known to occur in the proposed lease areas. Their estimated abundance in the western North Atlantic is presented in Table 4-2. These species are discussed in Chapter 4.2.8 of the Programmatic EIS.

Of these, six cetaceans and one sirenian that may occur in the proposed project vicinity are federally listed as endangered (see Table 4-2). The six whales species are the North Atlantic right whale, fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), humpback whale (*Megaptera novaeangliae*), sperm whale (*Physeter macrocephalus*), and blue whale (*Balaenoptera musculus*). In addition, one sirenian species, the West Indian manatee (*Trichechus manatus*) would potentially occur in the proposed action area. In addition to receiving protection under the ESA, each of these species is protected under the MMPA. As mandated by Section 7 of the ESA, the MMS has requested consultation with NMFS and USFWS on potential impacts of the proposed action on endangered/threatened marine mammals. For that consultation, the MMS prepared a biological assessment (BA) with detailed species descriptions, which this EA incorporates by reference (USDOJ, MMS, 2008b).

Table 4-2. Marine Mammals of the North Atlantic

Order, Suborder and Family of Cetacea	Common Name	Estimated Abundance of in the Western North Atlantic
Suborder Mysticeti (baleen whales)		
Family Balaenidae		
<i>Eubalaena glacialis</i>	North Atlantic right whale*	313
Family Balaenopteridae		
<i>Balaenoptera musculus</i>	blue whale*	300
<i>Balaenoptera physalus</i>	fin whale*	2269
<i>Balaenoptera borealis</i>	sei whale*	10,000
<i>Balaenoptera edeni</i>	Bryde's whale	40 (Gulf of Mexico)
<i>Balaenoptera acutorostrata</i>	minke whale	3,312
<i>Megaptera novaeangliae</i>	humpback whale*	10,600
Suborder Odontoceti (toothed whales)		
Family Physeteridae		
<i>Physeter macrocephalus</i>	sperm whale*	4,804
<i>Kogia breviceps</i>	pygmy sperm whale	395 (for all <i>Kogia</i> spp)
<i>Kogia simus</i>	dwarf sperm whale	395 (for all <i>Kogia</i> spp)
Family Ziphiidae		
<i>Hyperoodon ampullatus</i>	northern bottlenose whale	Unknown
<i>Mesoplodon densirostris</i>	Blainville's beaked whale	57 (<i>Mesoplodon</i> spp)
<i>Mesoplodon europaeus</i>	Gervais' beaked whale	57 (<i>Mesoplodon</i> spp)
<i>Mesoplodon mirus</i>	True's beaked whale	57 (<i>Mesoplodon</i> spp)
<i>Ziphius cavirostris</i>	Cuvier's beaked whale	3,513
Family Delphinidae		
<i>Orcinus orca</i>	killer whale	Unknown
<i>Lagenorhynchus albirostris</i>	white-beaked dolphin	2003
<i>Feresa attenuate</i>	pygmy killer whale	Unknown
<i>Globicephala macrorhynchus</i>	short-finned pilot whale	31,139 (<i>Globicephala</i> spp)
<i>Globicephala melas</i>	long-finned pilot whale	31,139 (<i>Globicephala</i> spp)
<i>Grampus griseus</i>	Risso's dolphin	20,479
<i>Peponocephala electra</i>	melon-headed whale	Unknown
<i>Tursiops truncatus</i>	Atlantic bottlenose dolphin	142,452 (Coastal and Offshore)
<i>Lagenorhynchus acutus</i>	Atlantic white-sided dolphin	63,368
<i>Delphinus delphis</i>	common dolphin	12,0743
<i>Stenella coeruleoalba</i>	striped dolphin	94,462
<i>Stenella attenuata</i>	panropical spotted dolphin	4,439
<i>Stenella clymene</i>	clymene dolphin	6,086
<i>Stenella frontalis</i>	Atlantic spotted dolphin	50,978
<i>Stenella longirostris</i>	spinner dolphin	Unknown
<i>Lagenodelphis hosei</i>	Fraser's dolphin	Unknown
Family Phocoenidae		
<i>Phocoena phocoena</i>	harbor porpoise	89054 (Gulf of Maine/Bay of Fundy stock)
Order Carnivora		
Suborder Pinnipedia		
Family Phocidae		
<i>Phoca vitulina</i>	harbor seal	99340
<i>Halichoerus grypus</i>	grey seal	Unknown
<i>Pagophilus groenlandicus</i>	harp seal	5,900,000
<i>Cystophora cristata</i>	hooded seal	592,100
Order Sirenia		
Family Trichechidae	West Indian manatee*	1,856

Source: Waring et al., 2007, 2006, 2002, 2000, and 1998; Blaylock et al., 1995; Smith et al., 1999

*Endangered

4.1.2.3.2 Impact Analysis of the Proposed Action

Chapter 5.2.8.2 of the Programmatic EIS discusses the impacts of site characterization activities on marine mammals. Activities associated with site characterization that may affect marine mammals include: (1) G&G surveys, (2) construction of one or more meteorological towers, (3) construction vessel traffic, (4) discharges of waste materials and accidental fuel releases, and (5) meteorological tower decommissioning.

Since the publication of the Programmatic EIS, NMFS published the 2007 Atlantic and Gulf of Mexico Marine Mammal Stock Assessment Reports (Waring et al., 2007). As required by the MMPA, the stock assessments include each species' potential biological removal (PBR) level. This is an estimate of the maximum number of animals, not including natural mortalities that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population level. For most Atlantic marine mammal species, the annual number of human-related mortalities and serious injuries does not exceed the PBR. In the case of three whale species (northern right, humpback, and sei), a loss of one individual could effect the population level. However, the proposed activities are expected to have a negligible impact to all marine mammal species in the proposed action area. This conclusion is further discussed below.

Geological and Geophysical Surveys

The G&G surveys may be employed to characterize ocean-bottom topography and subsurface geology. Specifically, high resolution site surveys would be used under the proposed action to characterize the potential site of the meteorological tower. High resolution site surveys and sub-bottom profiling tools use less intense sound sources than larger air guns that are used for deeply penetrating 2D and 3D exploratory seismic surveys, and result in much shallow penetration of the seafloor and less energy (sound) introduced into the environment. According to the G&G Programmatic EA, air guns used in high-resolution site surveys ranged from 229 dB re 1 μ Pa at 1 meter with a spectral content from 40 to 300 Hz (6 dB down points from peak at 130 Hz) to 226 dB re 1 μ Pa at 1 meter (high cut filter at 128 Hz).

Noise generated by such surveys may have physical and/or behavioral effects on marine mammals, such as (1) temporary or permanent hearing loss, discomfort, and injury; (2) masking of important sound signals; (3) behavioral responses such as fright, avoidance, and changes in physical or vocal behavior; and (4) tolerance (Richardson et al., 1995; Davis et al., 1998; Gordon et al., 1998). Permanent hearing impairment, in the unlikely event that it occurred, would constitute injury, but temporary threshold shift (TTS) is not an injury (Southall et al., 2007). However, these types of effects have not been directly tested for and are likely difficult to detect (i.e., delayed mortality, sinking of carcasses). The biological importance of such responses (e.g., effects on energetics, survival, reproduction, population status) is unknown, and there is little information regarding short-term or long-term effects of behavioral reactions on marine mammal populations.

The G&G characterization for siting meteorological towers would most likely employ low-energy and high-frequency techniques, such as side-scan sonar rather than air-gun arrays, physical impacts to marine mammals from G&G surveys may be less likely to occur. Side-scan sonar is a low-energy system that generates noise levels that may be less likely to cause hearing impairment or physical injury. For example, the NMFS (2002), in issuing an incidental harassment authorization for seismic data collection off of southern California, concluded that the short-term impact of collecting marine seismic reflection data with multiple instrument systems including side-scan sonar would result, at worst, in a temporary modification in the behavior of certain species of marine mammals and possibly some individuals. It was further concluded that while behavioral modifications may occur in some species of marine mammals to avoid the noise generated by the air gun arrays, the behavioral changes are expected to affect only small numbers of each of several species of marine mammals that may be present in the survey area and would have no more than a negligible impact on the affected species of marine mammals. Marine mammals in the vicinity of the G&G surveys may be expected to be similarly affected, although the nature and

magnitude of potential effects would depend on the location of a proposed project, the species affected, the number of individuals affected, the time of year, and the survey instrumentation used at that location.

Marine mammals are mobile and may be expected to quickly leave an area when a G&G survey is initiated. While a G&G I survey may disturb more than one individual, routine surveys are not expected to result in population-level effects. Individuals disturbed by a survey would likely return to normal behavioral patterns after the survey has ceased (or after the animal has left the survey area).

Because of its restriction to nearshore coastal marine and freshwater habitats, the endangered West Indian manatee would be unlikely to come in contact with offshore G&G surveys. The marine mammals most likely to be exposed to and affected by such routine surveys are the cetaceans. Several species of cetaceans have shown avoidance reactions to G&G activities.

However, it is important to note that site characterization would most likely use low-energy side-scan sonar rather than high-energy air guns, marine mammals are not expected to be exposed to sound pressure levels that could cause hearing damage. Side-scan sonar, which uses a low-energy, high-frequency signal, is not expected to affect marine mammals. Side-scan sonar has been used extensively to investigate a wide variety of aquatic biota, from benthic organisms to whales, with little evidence of adverse effects (see USGS, 2007; Kirk and Nelson, 1984). Because of the limited location and duration of G&G surveys that may be conducted during site characterization, few individuals may be expected in most cases to be present within the survey areas. Thus, potential population-level impacts on marine mammals from G&G surveys are expected to be negligible. Last, G&G surveys are expected to have a limited duration and it is likely that marine mammals would leave the immediate vicinity of the surveys. Therefore, impacts of such surveys to marine mammals would be negligible.

Construction-related Noise

During meteorological tower construction, marine mammals in the vicinity of the construction site may be disturbed by noise generated during pile driving. Pile driving would generate sound levels up to 180 dB and have a relatively broad band of 20 Hz to >20 kHz (Madsen et al., 2006; Thomsen et al., 2006). Such noise could disturb normal behaviors (e.g., feeding, social interactions), mask calls from conspecifics, disrupt echolocation capabilities, and mask sounds generated by predators. Behavioral effects may be incurred at ranges of many miles, and hearing impairment may occur at close range (Madsen et al., 2006). Behavioral reactions may include avoidance of, or flight from, the sound source and its immediate surroundings, disruption of feeding behavior, interruption of vocal activity, and modification of vocal patterns (Watkins and Scheville, 1975; Malme et al., 1984; Bowles et al., 1994; Mate et al., 1994). However, due to delays caused by weather and sea state conditions, acquiring required federal permits, and availability of vessels, workers, and tower components, the proposed meteorological towers may not be installed during the first year of the 5-year lease term and may have to be installed over more than one construction season. If installation occurs over two construction seasons, then it is likely the foundation would be installed first with limited meteorological equipment mounted on the platform deck, and the mast and remaining equipment would be installed the following year. Pile driving activities would occur during the first year if installation occurs over two construction seasons. Depending on the frequency of the noise generated during construction of the meteorological towers, impacts to marine mammals may also include temporary hearing loss or auditory masking (Madsen et al., 2006). The biological importance of hearing loss or behavioral responses to construction noise (e.g., effects on energetics, survival, reproduction, population status) is unknown, and there is little information regarding short-term or long-term effects of behavioral reactions on marine mammal populations. While noise generated during construction of a meteorological tower may affect more than one individual, population-level effects are not anticipated. Some species may be expected to quickly leave the area with the arrival of construction vessels, before pile-driving activities are begun, while individuals remaining in the area may flee with the initiation of construction, thereby greatly reducing their exposure to maximal sound levels and, to a lesser extent, masking frequencies. Individuals disturbed by or experiencing masking due to construction noise would likely return to normal behavioral patterns after the construction had ceased.

(pile driving is anticipated to be completed within a 3-day period), or after the animal has left the survey area.

In a supplemental filing, Bluewater provided an analysis of construction noise (Tetra Tech EC, Inc., 2008), which is applicable to construction of all proposed meteorological towers addressed in this EA. “Results of the screening level analysis show that overall broadband underwater sound levels as a result of pile driving based on best available data at the preferred MCDF site are expected to range from 185 dBL re 1 μ Pa to 200 dBL re 1 μ Pa depending on pile size and impact hammer force. These calculation results are comparable to non-site-specific estimates presented in the MMS document entitled “Worldwide Synthesis and Analysis of Existing Information Regarding Environmental Effects of Alternative Energy Uses on the Outer Continental Shelf”, with overall broadband received sound pressure values ranging from 190 dBL re 1 μ Pa at a distance of 400 meters to levels in excess of 200 dBL re 1 μ Pa at a distance of 100 meters.”

Injury of marine species that could be caused by the pile driving noise are expected only in the immediate vicinity of the pile driving activity at distances of the order of 100 meters, and behavioral effects at ranges of the order of 10 kilometers. During the second construction season, the remaining above-water equipment would be installed. Some anthropogenic sound from the construction activities would resonate through the mast and platform deck, but the main concern is the additional vessel traffic. However, construction of a meteorological tower would be of relatively short duration and limited to seven locations. The monitoring and mitigations set forth in Appendix A of this EA reduce the chance of injury and harassment. Because marine mammals would be expected to leave the immediate vicinity of the tower during its construction, impacts to marine mammals in general would be short term and minor.

Vessel and Helicopter Traffic

Vessel traffic bringing equipment and personnel to meteorological tower construction sites may affect marine mammals either by direct collisions with vessels or by disturbances from either vessels or helicopters. All of the proposed meteorological towers may not be installed during the first year of the 5-year lease term and may have to be installed over more than one construction season. At least 11 species of cetaceans have been documented to have been hit by ships in the world’s oceans, and in most cases the whales were not seen beforehand or were seen too late to avoid collision (Laist et al., 2001; Jensen and Silber, 2004). Whale strikes have been reported at vessel speeds ranging from 2 to 51 knots (2 to 59 mph), with most lethal or severe injuries occurring at ship speeds of 14 knots (16 mph) or more (Laist et al., 2001; Jensen and Silber, 2004). Whale strikes have occurred with a wide variety of vessel types, including Navy vessels, container and cargo ships, freighters, cruise ships, and ferries (Jensen and Silber, 2004), and collisions with vessels greater than 80 meters (260 feet) in length are usually either lethal or result in severe injuries (Laist et al., 2001).

Ship strikes have been recorded in U.S. waters in almost every coastal State. Collisions between whales and vessels have been most commonly reported along the Atlantic Coast, followed by the Pacific Coast (including Alaska and Hawaii); ship-whale collisions have been least common in the Gulf of Mexico (Jensen and Silber, 2004). In addition, most ship strikes seem to occur over or near the continental shelf (Laist et al., 2001). The most frequently struck species has been the fin whale, followed by humpback, North Atlantic right, gray, minke, southern right, and sperm whales (Jensen and Silber, 2004). Among these species, the sperm whale is a common resident of the northern Gulf, as well as the Atlantic seaboard, the North Atlantic right whale has six major congregation areas from Florida to Maine, the humpback and fin whale congregate at feeding grounds in the North Atlantic. Thus, among these species, the sperm whale, the North Atlantic right whale, the humpback whale and fin whale may be considered most likely to encounter vessels supporting the construction of meteorological towers on OCS waters.

Their slow movements and time spent at the surface and near the coast make right whales highly vulnerable to being struck by ships, especially since shipping lanes into East Coast ports cut across their migration routes. On December 9, 2008, the NOAA issued regulations requiring ships 19.8 meters (65 feet) or longer to travel at 10 knots (11.5 miles per hour) or less in certain areas where right whales

gather. The purpose of the regulations is to reduce the likelihood of deaths and serious injuries to endangered North Atlantic right whales that result from collisions with ships. This regulation would benefit other marine mammal species. These new restrictions extend out to 37 kilometers (20 nautical miles) around major mid-Atlantic ports, which would include the proposed lease areas. Except for crew boats, which are typically smaller than 19.8 meters (65 feet), these restrictions would be applicable to most vessels associated with the proposed action. While most site assessment surveys, and construction and decommissioning activities would occur in late spring and summer, speed restrictions would be in effect from November 1st to April 30th. However there is a call for temporary voluntary speed limits at other times when a group of three or more right whales is confirmed.

Vessel collision is the principle threat to the recovery of the West Indian manatee, which congregates in coastal waters along the east coast of Florida. Most deaths are caused by vessel impact, followed by propeller cuts, while many living manatees bear scars or wounds from vessel strikes. Over the last 25 years, a clear increase in mortality has been noted in the manatee population in the southeastern U.S., largely attributable to watercraft collisions (USFWS, 2001). Between 1976 and 2000, deaths caused by watercraft collisions increased by 7.2 percent per year; as a result, boat speed regulations have been implemented in areas with high manatee concentrations along the east coast of Florida (USFWS, 2001). Because of its restriction to nearshore coastal marine and freshwater habitats, the endangered West Indian manatee would be unlikely to come in contact with vessel traffic bringing equipment and personnel to meteorological tower construction sites.

Among the non-listed and smaller cetaceans and pinnipeds, many are relatively abundant and thus may be more likely to encounter OCS-related vessels that are in transit to and from meteorological tower construction sites. At times, many of these species, such as the dolphins and seals, are attracted to moving vessels and spend periods of time following moving vessels or swimming within the bow waves of ships, even those traveling at high speeds. Because these species are agile, powerful swimmers, they are usually capable of avoiding collisions with oncoming vessels. Nevertheless, some may be injured by vessels (e.g., contacting propellers). Such injuries may or may not be lethal, and they may be expected to be relatively uncommon and not result in population-level effects. Vessel strikes in inland waterways are a major cause of death in the manatee population (USFWS, 2002). This species could encounter OCS-related vessels traveling between construction sites and inland harbors and marinas. However, because this species is rare offshore Delaware and New Jersey, encounters with the very limited number of meteorological tower construction vessels expected in these areas would be unlikely. Impacts from vessel strikes may be expected to be minor for most species, but could be moderate to major for species that are threatened or endangered, such as the mysticetes (baleen whales). However, significant impacts would be unlikely due to the small amount of vessel traffic, even if the proposed meteorological towers are installed during two construction seasons; short duration of survey, construction and decommissioning activities; and existing and proposed monitoring requirements for marine mammals.

In addition to vessel collisions, marine mammals may also be affected by the noise generated by surface vessels traveling to and from construction sites. Exposure of marine mammals to individual construction vessels would be transient, and the noise intensity would vary depending upon the source and specific location. Reactions of marine mammals may include apparent indifference, cessation of vocalizations or feeding activity, and evasive behavior (e.g., turns, diving) to avoid approaching vessels (Richardson et al., 1995; Nowacek and Wells, 2001). Behavior would likely return to normal following passage of the vessel or helicopter, and it is unlikely that such short-term effects would result in long-term population-level impacts for most species of marine mammals. Thus, impacts from vessel noise would be short-term and negligible.

Marine mammals may also be disturbed as a result of over-flights of helicopters supporting offshore construction activities (but would not be used during operations and maintenance). Individuals beneath or near the flight paths may be startled by the presence of noise of the passing helicopter, ceasing normal behaviors and diving or fleeing the immediate area to avoid the oncoming helicopter (see Richardson et al., 1995; Withrow et al., 1985), but may be expected to return after the helicopter has left the area. Large groups of humpbacks have been observed to show little to no response to small aircraft, while groups

containing only adults showed some avoidance (Richardson et al.; 1995). Fin whales have been observed to react slightly to small aircraft circling at altitudes of about 160 to 980 feet (50 to 300 meters) above the surface. Marine mammals disturbed by helicopter over-flights may be expected to cease their normal behaviors, but the effects are believed to be negligible.

The FAA regulates helicopter flight patterns. Because of noise concerns, FAA Circular 91-36D encourages pilots making flights near noise-sensitive areas to fly at altitudes higher than minimum altitudes near noise-sensitive areas (available at <http://www.fs.fed.us/r10/tongass/districts/admiralty/packcreek/AC91-36d.pdf>). Avoidance of noise-sensitive areas, if practical, is preferable. Pilots operating noise producing aircraft over noise-sensitive areas should make every effort to fly not less than 2,000 feet above ground level, weather permitting. Departure from or arrival to an airport, climb after take-off, and descent for landing should be made so as to avoid prolonged flight at low altitudes near noise-sensitive areas. In addition, guidelines and regulations issued by NMFS under the authority of the MMPA include provisions specifying helicopter pilots to maintain an altitude of at least 1,000 feet within sight of marine mammals.

Discharge of Waste Materials and Accidental Fuel Leaks

Marine mammals could be exposed to operational discharges or accidental fuel releases from construction sites and construction vessels and to accidentally released solid debris. Operational waste generated from service vessels includes bilge and ballast waters, trash and debris, and sanitary and domestic wastes (Chapter 3.1.4.1 of this EA). Operational discharges from construction vessels would be released into the open ocean where they would be rapidly diluted and dispersed, or collected and taken to shore for treatment and disposal. Sanitary and domestic wastes would be processed through on-site waste treatment facilities before being discharged overboard or would be tanked to shore for disposal there. Deck drainage would also be processed prior to discharge. Thus, waste discharges from construction vessels would not be expected to directly affect marine mammals.

The ingestion of solid debris or entanglement with it can adversely impact marine mammals. Mammals that have ingested debris, such as plastic, may experience intestinal blockage, which in turn may lead to starvation, while toxic substances present in the ingested materials (especially in plastics) could lead to a variety of lethal and sub-lethal toxic effects. Entanglement in plastic debris can result in reduced mobility, starvation, exhaustion, drowning, and constriction of, and subsequent damage to, limbs caused by tightening of the entangling material. The discharge or disposal of solid debris into offshore waters from OCS structures and vessels is prohibited by the MMS (30 CFR 250.300) and the USCG (MARPOL, Annex V, Public Law 100-220 [101 Statute 1458]). Thus, MMS and USCG are expected to enforce such prohibitions and the entanglement in or ingestion of proposed action-related trash and debris by marine mammals would not be expected. Because of the very limited amount of vessel traffic and construction activity that might occur with construction and operation of a meteorological tower, the release of liquid wastes would occur infrequently and cease following completion of tower construction. The likelihood of an accidental fuel release would also be limited to the active construction and decommissioning periods of the site characterization. Impacts to marine mammals from the discharge of waste materials or the accidental release of fuels are expected to be negligible.

Meteorological Tower Decommissioning

Upon completion of site characterization, the meteorological tower would be removed and transported by barge to shore. During this activity, marine mammals may be affected by noise and operational discharges as described for meteorological tower installation. Removal of the piles would be accomplished by cutting the piles (using mechanical cutting or high-pressure water jet) at a depth of 4.6 meters (15 feet) below the seabed. Marine mammals could be affected by noise during pile cutting. Only individuals in the immediate vicinity of the characterization site (those that had not moved away from the area upon arrival of decommissioning vessels) would be expected to be affected during tower removal.

and transport, and pile cutting. Therefore, disturbance of marine mammals during decommissioning is expected to be negligible.

Proposed Mitigation Measures

The following lease stipulations have been proposed to reduce the potential impacts of the proposed action on marine mammals from vessel traffic, seismic surveys, construction activities including pile driving, and accidental introduction of trash and debris:

- The proposed Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program (see Appendix A.2) contains mitigation, monitoring and reporting requirements that would be implemented during the conduct of all high-resolution seismic surveying work including the establishment of visual and exclusion zones, and ramp up and down procedures;
- The proposed Reduction or Elimination of the Potential for Adverse Impacts Activities on Protected Species from Construction Stipulation (see Appendix A.3) would reduce or eliminate the potential for adverse impacts to protected species from construction activities by requiring pre-construction briefings between crews and marine mammal visual observers, and establishing exclusion zones during pile driving;
- The proposed Reduction or Elimination of the Potential for Adverse Impacts from Pile Driving Stipulation (see Appendix A.4) would reduce or eliminate the potential for adverse impacts from pile driving by requiring the use of vibratory hammers rather than impact hammers to the extent possible, and if impact hammers are used, would require monitoring and implementation of “soft starts;”
- The proposed Vessel Strike Avoidance Stipulation (see Appendix A.5) would require that specific measures meant to reduce the potential for vessel harassments or collisions with ESA-listed marine mammals during all phases of the project would be followed including training, speed restrictions, avoidance zones, and reporting requirements; and,
- In addition to the regulations that already exist governing the discharge and treatment of service-vessel operational wastes, the proposed Marine Trash and Debris Awareness and Elimination Stipulation (see Appendix A.6) would reduce or eliminate the risk of intentional and/or accidental introduction of debris into the marine environment by requiring that all vessel operators, employees and contractors actively engaged in offshore operations be instructed on marine trash and debris awareness and elimination.

Conclusion

The proposed action and subsequent effects to marine mammals are expected to be short term and would result in minimal to negligible behavioral harassment and would not result in injury or death. The mitigation and monitoring measures proposed would minimize or eliminate the potential for harmful effects on marine mammals from vessel traffic, seismic surveys, construction activities including pile driving, and accidental introduction of trash and debris. Therefore, the proposed action would not significantly affect marine mammals.

4.1.2.4 Sea Turtles

4.1.2.4.1 Description of the Affected Environment

Five species of sea turtles are known to inhabit the Atlantic Ocean. These species include the loggerhead (*Caretta caretta*), green (*Chelonia mydas*), hawksbill (*Eretmochelys imbricata*), Kemp’s ridley (*Lepidochelys kempii*), and leatherback (*Dermochelys coriacea*) sea turtles. Their relative occurrence in the western North Atlantic is presented in Table 4-3. These five species of sea turtles could potentially utilize the proposed lease areas. They are all highly migratory, and no individual members of any of the species are likely to be year-round residents of the proposed lease areas. Individual animals

will make migrations into nearshore waters as well as other areas of the North Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea.

All sea turtles have a protected status (with respect to the ESA and the Convention on International Trade in Endangered Species [CITES]). As mandated by Section 7 of the ESA, MMS has requested consultation with NMFS on potential impacts of the proposed action on sea turtles. For that consultation, MMS prepared a BA with detailed species descriptions, which this EA incorporates by reference (USDOI, MMS, 2008b). These species are discussed in Chapter 4.2.12 of the Programmatic EIS.

Table 4-3. Sea Turtle Taxa of the Western North Atlantic

Order Testudines (turtles)	Relative Occurrence*	ESA Status**
Family Cheloniidae (hardshell sea turtles)		
Loggerhead sea turtle (<i>Caretta caretta</i>)	Common	Threatened
Green sea turtle (<i>Chelonia mydas</i>)	Uncommon	Threatened
Hawksbill sea turtle (<i>Eretmochelys imbricata</i>)	Rare	Endangered
Kemp's Ridley sea turtle (<i>Lepidochelys kempii</i>)	Common	Endangered
Family Dermochelyidae (leatherback sea turtle)		
Leatherback sea turtle (<i>Dermochelys coriacea</i>)	Uncommon	Endangered
<p>*Population status in the western north Atlantic is summarized according to the following categories:</p> <p>Common: A common species is one that is abundant wherever it occurs in the region (i.e., the western north Atlantic). Most common species are widely distributed over the area.</p> <p>Uncommon: An uncommon species may or may not be widely distributed but does not occur in large numbers. Uncommon species are not necessarily rare or endangered.</p> <p>Rare: A rare species is one that is present in such small numbers throughout the region that it is seldom seen. Although not threatened with extinction, a rare species may become endangered if conditions in its environment change.</p> <p>**ESA status is summarized according to listing status under the following categories:</p> <p>Endangered: Species determined to be in imminent danger of extinction throughout all of a significant portion of their range.</p> <p>Threatened: Species determined likely to become endangered in the foreseeable future.</p>		

Sea Turtle Hearing and Sensitivity to Acoustic Impact

Data on sea turtle sound production and hearing are few. There is little known about the mechanism of sound detection by turtles, including the pathway by which sound gets to the inner ear and the structure and function of the inner ear of sea turtles (Bartol and Musick, 2003). However, assumptions have been made based on research on other species of turtles. Based on the structure of the inner ear, there is some evidence to suggest that marine turtles primarily hear sounds in the low frequency range and this hypothesis is supported by the limited amount of physiological data on turtle hearing. Bartol and Musick (2003) state that the amount of pressure needed to travel through the bone channel of the ear increases with an increase in frequency. For this reason, it is believed that turtles are insensitive to high frequencies and that they primarily hear in a low frequency range. A description of the ear and hearing mechanisms can be found in Bartol and Musick (2003).

The few studies completed on the auditory capabilities of sea turtles also suggest that they could be capable of hearing LF sounds, particularly as adults. These investigations examined adult green,

loggerhead, and Kemp's ridley sea turtles (Ridgway et al., 1969; Mrosovsky, 1972; O'Hara and Wilcox, 1990; Bartol et al., 1999). There have been no published studies to date of olive ridley, hawksbill, or leatherback sea turtles (Ridgway et al.; 1969; O'Hara and Wilcox, 1990; Bartol et al.; 1999).

Relatively little is documented or understood, for any sea turtle species, about their hearing ability or their dependency on sound, passive or active, for survival cues. Moreover, since sea turtles often have been reported to show a lack of response to even intense sounds (Wever, 1978), they were initially characterized as having insensitive hearing capabilities. A number of factors, including anatomy, electrophysiological response, and behavioral responses to sound, need to be considered when evaluating the hearing capabilities of sea turtles.

The anatomy of the sea turtle ear does not lend itself to aerial conduction but rather is structured for sound conduction through two media, bone and water (Békésy, 1948; Lenhardt, 1982; Lenhardt and Harkins, 1983). Neither mode of auditory reception is mutually exclusive; instead, the sea turtle appears to be able to process sound through both pathways. Moreover, from the structure and impedance of the tympanum, the sea turtle ear appears to be a poor aerial receptor (DeBurlet, 1934; Manley, 1970; Lenhardt et al., 1985). Consequently, the audiogram for the green sea turtle in air (Ridgway et al., 1969) provides information on frequency ranges but not the intensities to which the animal might respond.

Complicating this picture is the fact that each life stage of sea turtles is marked by exceptional differences in gross morphology of auditory structures and in the physical parameters of their habitat. It is believed that physiological and behavioral adaptations may have evolved for the sea turtle on the basis of their selection of aquatic niches with each ontogenetic stage. For these three stages of life, the sensory environment is also changing. Shallow water habitats of the juvenile and adult stages are a much "noisier" world than the open ocean environment of the hatchling stage. Ambient noise in the inshore environment is heavily weighted to low frequency sound (Hawkins and Myrberg, 1983). In highly developed areas, low frequency noises associated with shipping lanes, recreational boat traffic, and biological organisms are prominent.

Differences in hearing capability (frequency selectivity and threshold levels) among species and life history stages have not been documented for sea turtles in the literature. In fact, only two species, loggerhead and green sea turtles, and one life history stage, juvenile, have undergone any auditory investigations.

4.1.2.4.2 Impact Analysis of the Proposed Action

Chapter 5.2.12.2 of the Programmatic EIS discusses the impacts of site characterization activities on sea turtles. Activities associated with site characterization that may affect sea turtles include: (1) G&G surveys, (2) construction of one or more meteorological towers, (3) construction vessel traffic, (4) discharges of waste materials and accidental fuel releases, and (5) meteorological tower decommissioning.

Geological and Geophysical Surveys

Few studies are available on sea turtle hearing sensitivity or noise-induced stress (Ridgway et al., 1969; Bartol et al., 1999); thus, it is largely unknown how sea turtles might respond to and be affected by G&G surveys. Surveys using air-gun arrays may generate low-frequency noise at levels up to 250 dB re 1 μ Pa-m, and these may be detected by sea turtles within the survey area (Geraci and St. Aubin, 1987). In contrast, side-scan sonar generates noise at much lower intensity and higher frequencies, which may not be as readily detected. Potential responses to survey noises may be expected to be behavioral, and include avoidance of the noise source, disorientation, and disturbance of normal behaviors such as feeding. If an air gun is used, sea turtles immediately below an air gun may experience sound pressure levels that could cause hearing damage.

Because site assessment surveys would use low-energy side-scan sonar rather than high-energy air guns, sea turtles are not expected to be exposed to sound pressure levels that could cause hearing damage. Side-scan sonar, which uses a low-energy, high-frequency signal, is not expected to affect sea turtles.

Side-scan sonar has been used extensively to investigate a wide variety of aquatic biota, from benthic organisms to whales, with little evidence of adverse effects (see USGS, 2007; Kirk and Nelson, 1984). Because of the limited location and duration of G&G surveys that may be conducted during site characterization, few individuals may be expected in most cases to be present within the survey areas and the presence of turtles in the proposed action area are only expected for a short part of the year. In addition, any potential impacts would be short-term in nature given the short duration of these surveys.

Meteorological Tower Construction

During meteorological tower construction, sea turtles in the vicinity of the construction site may be disturbed by noise generated during pile driving. Total installation time for one meteorological tower would take eight days to ten weeks depending on the type of structure installed, and the weather and sea state conditions. However, due to delays caused by weather and sea state conditions, acquiring required federal permits, and availability of vessels, workers, and tower components, the proposed meteorological towers may not be installed during the first year of the 5-year lease term and may have to be installed over more than one construction season. If installation occurs over two construction seasons, then it is likely the foundation would be installed first with limited meteorological equipment mounted on the platform deck, and the mast and remaining equipment would be installed the following year. Most noise generated during pile driving would exhibit sound levels up to 180 dB and have a relatively broad band of 20 Hz to greater than 20 kHz (Madsen et al., 2006; Thomsen et al., 2006). These installation activities would occur during the first year if installation occurs over two construction seasons. Such noise could disturb normal behaviors (e.g., feeding) and cause affected individuals to move away from the construction area. The biological importance of behavioral responses to construction noise (e.g., effects on energetics, survival, reproduction, population status) is unknown, and there is little information regarding short-term or long-term effects of behavioral reactions on sea turtle populations. While noise generated during construction of a meteorological tower may affect more than one individual, population-level effects are not anticipated. Few individuals are expected to be exposed to construction noise, given the short-term duration of construction activities, geographic area affected, lack of presence in these areas during portions of the year, and the addition of proposed monitoring and mitigation measures. During the second construction season, the remaining above-water equipment would be installed. Some anthropogenic sound from the construction activities would resonate through the mast and platform deck, but the main concern is the additional vessel traffic. However, since these activities would be short-term and the geographic area affected is small, and with the addition of monitoring and mitigation measures, population-level effects are not anticipated.

Vessel Traffic

Sea turtles have been killed or injured by collisions with vessels. Because of their limited swimming abilities, hatchlings may be more susceptible than juveniles or adults to vessel collisions, especially if they are aggregated in areas of current convergence or in mats of floating *Sargassum*. The likelihood of collision would vary depending upon species and life stage, the location of the vessel, and its speed and visibility. Hatchling turtles, including those aggregated in convergence zones or patches of *Sargassum*, would be difficult to spot from a moving vessel because of their small size and generally cryptic coloration patterns, which blend in with the color and patterns of the *Sargassum*. While adult and juvenile turtles are generally difficult to observe at the surface during periods of daylight and clear visibility, they are very difficult to spot from a moving vessel when they are resting below the water surface, and during night and periods of inclement weather.

Despite the possibility of construction occurring over two years, because of the small amount and short duration of vessel traffic that would be associated with meteorological tower construction, population-level impacts to sea turtles from vessel collisions are not expected.

Waste Discharge and Accidental Fuel Releases

During meteorological tower construction, a variety of sanitary and other waste fluids, and miscellaneous trash and debris, may be generated. Hatchling, juvenile, and adult sea turtles may be exposed to these wastes by discharges from the vessels. Operational discharges from vessels would be released into the open ocean where they would be rapidly diluted and dispersed, or collected and taken to shore for treatment and disposal. Sanitary and domestic wastes would be processed through shipboard waste treatment facilities before being discharged overboard. Deck drainage would also be processed prior to discharge.

Ingestion of plastic and other non-biodegradable debris has been reported for almost all sea turtle species and life stages (USDOC, NOAA, 2003). Ingestion of waste debris has resulted in gut strangulation, reduced nutrient uptake, and increased absorbance of various chemicals in plastics and other debris (USDOC, NOAA, 2003). Sub-lethal quantities of ingested plastic debris can result in various effects including positive buoyancy, making sea turtles more susceptible to collisions with vessels, increasing predation risk or reducing feeding efficiency (Lutcavage et al., 1997). Some species of adult sea turtles, such as loggerheads, appear to readily ingest plastic debris that is appropriately sized. In oceanic waters, floating or subsurface translucent plastic material and sheeting may be mistaken for gelatinous prey items such as jellyfish. Entanglement in debris (such as rope) can result in reduced mobility, drowning, and constriction of and subsequent damage to limbs (Lutcavage et al., 1997).

The discharge or disposal of solid debris into offshore waters from OCS structures and vessels is prohibited by the USCG (MARPOL, Annex V, Public Law 100–220 [101 Statute 1458]). Assuming compliance with regulations and laws and only accidental releases, very little exposure of sea turtles to solid debris generated during meteorological tower construction would be anticipated.

Meteorological Tower Decommissioning

Upon completion of site characterization, the meteorological towers would be removed and transported by barge to shore. During this activity, sea turtles may be affected in the same manner as described for meteorological tower construction. Removal of the mooring piles would be accomplished by cutting the piles (using mechanical cutting or high-pressure water jet) at a depth of 4.6 meters (15 feet) below the seabed, and sea turtles in the immediate vicinity could be disturbed by noise during the cutting of the pilings. Affected animals may be expected to move away from the immediate vicinity of the site.

Proposed Mitigation Measures

The following lease stipulations have been proposed to reduce the potential impacts of the proposed action on sea turtles from vessel traffic, seismic surveys, construction activities including pile driving, and intentional and/or accidental introduction of trash and debris:

- The proposed Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program (see Appendix A.2) contains mitigation, monitoring and reporting requirements that would be implemented during the conduct of all high-resolution seismic surveying work including the establishment of visual and exclusion zones, and ramp up and down procedures;
- The proposed Reduction or Elimination of the Potential for Adverse Impacts Activities on Protected Species from Construction Stipulation (see Appendix A.3) would reduce or eliminate the potential for adverse impacts to protected species from construction activities by requiring pre-construction briefings between crews and sea turtle visual observers, and establishing exclusion zones during pile driving;
- The proposed Reduction or Elimination of the Potential for Adverse Impacts from Pile Driving Stipulation (see Appendix A.4) would reduce or eliminate the potential for adverse impacts from pile driving by requiring the use of vibratory hammers rather than impact hammers to the extent possible, and if impact hammers are used, would require monitoring and implementation of “soft starts;”

- The proposed Vessel Strike Avoidance Stipulation (see Appendix A.5) would require that specific measures meant to reduce the potential for vessel harassments or collisions with sea turtles during all phases of the project would be followed including training, speed restrictions, avoidance zones, and reporting requirements; and,
- In addition to the regulations that already exist governing the discharge and treatment of service-vessel operational wastes, the proposed Marine Trash and Debris Awareness and Elimination Stipulation (see Appendix A.6) would reduce or eliminate the risk of intentional and/or accidental introduction of debris into the marine environment by requiring that all vessel operators, employees and contractors actively engaged in offshore operations be instructed on marine trash and debris awareness and elimination.

In addition to the regulations that already exist governing the discharge and treatment of service-vessel operational wastes, the proposed Marine Trash and Debris Awareness and Elimination Stipulation would reduce or eliminate the risk of intentional and/or accidental introduction of debris into the marine environment by requiring that all vessel operators, employees and contractors actively engaged in offshore operations be instructed on marine trash and debris awareness and elimination.

Conclusion

The proposed action and subsequent effects to sea turtles are expected to be short term and would result in minimal to negligible impacts. The mitigation and monitoring measures proposed would minimize or eliminate the potential for harmful effects on sea turtles from vessel traffic, seismic surveys, construction activities including pile driving, and intentional and/or accidental introduction of trash and debris. Therefore, the proposed action would not significantly affect sea turtles.

4.1.2.5 Birds

4.1.2.5.1 Description of the Affected Environment

A listing of all birds that can be found in New Jersey, along with their status, is available on the New Jersey Division of Fish and Wildlife's website <http://www.state.nj.us/dep/fgw/chkbirds.htm>. A listing of all birds that can be found in Delaware is available on the Delmarva Ornithological Society's website at http://www.dosbirds.org/committees/de_rec_results.php?opt=Full+List.

The waters off Delaware Bay, Raritan Bay, and the Atlantic Ocean off New Jersey and Delaware are used by large numbers of waterbirds and pelagic species of various types, as well as some shorebirds, songbirds and raptors. There is also evidence that small numbers of owls are transients in this area at times, and in some places the numbers may be substantial (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004).

Migratory Birds

The Atlantic Coast, including Delaware and New Jersey, plays an important role in the ecology of many bird species. The Atlantic Flyway is a major route for migratory birds, which are protected under the Migratory Bird Treaty Act of 1918. Chapter 4.2.9.3 of the Programmatic EIS discusses the use of Atlantic Coast habitats by migratory birds.

Bald and Golden Eagles

The Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. 668-668d) prohibits the take and commerce of bald and golden eagles. Take is defined by the Act as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb." Both the bald and golden eagle winter in and migrate through Delaware and New Jersey (NJDEP, Division of Fish and Wildlife, 2009; DELMARVA Ornithological Society, 2009). Bald eagles have historically been associated with forests near the Delaware River and Bay, but nest throughout Delaware and New Jersey. They nest in trees taller than the surrounding canopy to avoid human disturbance. Golden eagles favor more open areas in western States,

and do not typically nest in Delaware and New Jersey (USFWS, 2007a). Both migrate over land rather than the open ocean.

ESA-Listed Birds

Two species of federally endangered or threatened species of birds occur in Atlantic OCS waters off of Delaware and New Jersey during at least part of the year. These species are the endangered, northeastern U.S. population of the roseate tern, and the threatened piping plover. Coastal habitats used by these species may include offshore areas, coastal beaches, and intertidal wetlands and marshes wetlands. There is currently only one bird species, the red knot (*Calidris canutus rufa*), identified from the Atlantic Coast States as a candidate for listing as threatened or endangered under ESA (USFWS, 2006a).

Piping Plover

The piping plover (*Charadrius melodus*) is a shorebird that inhabits coastal sandy beaches and mudflats. This species is currently in decline and listed as endangered in the Great Lakes watershed (breeding range of the Great Lakes population of this species) and as threatened in the remainder of its range. It is listed as a result of historic hunting pressure, and loss and degradation of habitat (USFWS, 2006b). Critical wintering habitat has been established in each of the Gulf Coast States for all three populations (Atlantic, Great Lakes, and Great Plains) of the piping plover (66 FR 36038–36143).

According to the “New Jersey Offshore Wind Energy: Feasibility Study” (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004), this federally threatened and New Jersey endangered beach-nesting shorebird nests on New Jersey beaches from Sandy Hook to Cape May from April to October (arriving in late March). These birds feed entirely on the shore and are confined to the vicinity of their nests during that season. During the migration season, some individuals flying to nesting areas farther north along the coast undoubtedly fly along the New Jersey coast and may cross from Sandy Hook to Long Island. They undoubtedly cross from Cape Henlopen, Delaware, to Cape May or even farther north along the Jersey shore before they reach land. It is not known if any of these birds fly directly over water from Delaware to New York, thereby flying through New Jersey offshore waters. Little is known about their migration flight behavior.

Roseate Tern

The roseate tern (*Sterna dougallii dougallii*) is a seabird that commonly ventures into oceanic waters; however, its western Atlantic population is known to occur in the far southeastern Gulf to breed in scattered colonies along the Florida Keys (Saliva, 1993; USFWS 1999). It is currently listed as endangered for populations along the U.S. Atlantic Coast from Maine to North Carolina, Canada and Bermuda; it is listed as threatened in Florida, Puerto Rico, the Virgin Islands, and the remaining western hemisphere and adjacent oceans. It historically has ranged along the Atlantic tropical and temperate coasts south to North Carolina; in Newfoundland, Nova Scotia, and Quebec, Canada; and in Bermuda (USFWS, 200b). No critical habitat has been designated for this species.

According to the “New Jersey Offshore Wind Energy: Feasibility Study” (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004) this species is listed as federally endangered because its population has declined dramatically and because these birds nest in a few, dense colonies making them potentially vulnerable to impacts. No Roseate Terns are known to nest in New Jersey, although in the summer of 2003, several individuals frequented the tern colony at Stone Harbor Point for several weeks. In addition, several Roseate Terns frequented the tern colonies at the Rockaways and Breezy Point area of Long Island during June and July (New York City Parks and Recreation biologist, personal communication), only a few miles from the New Jersey offshore study area. Although the species used to nest on western Long Island’s South Shore and in the 1920s and 1930s in southern New Jersey, they no longer do so. Roseate Terns are regular, although infrequent visitors to the Jersey Shore, mostly represented by a few individuals

Red Knot

Coastal habitats in the North Atlantic are considered critical to the survival of hemispheric populations of some shorebirds, such as red knots (Clark and Niles, 2000). According to the USFWS's website on the red knot (<http://www.fws.gov/northeast/redknot/>) the red knot is truly a master of long-distance aviation. Red knots fly more than 9,300 miles from south to north every spring and repeat the trip in reverse every autumn. Surveys of wintering knots along the coasts of southern Chile and Argentina and during spring migration in Delaware Bay on the U.S. coast indicate a serious population decline.

One of the conditions the species' survival depends on is the continued availability of billions of horseshoe crab eggs at major North Atlantic staging areas, notably the Delaware Bay and Cape May peninsula. The increase in taking of horseshoe crabs for bait in commercial fisheries that occurred in the 1990s may be a major factor in the decline in red knots.

4.1.2.5.2 Impact Analysis of the Proposed Action

Chapter 5.2.9.2 of the Programmatic EIS discusses the impacts of site characterization activities on birds. Site characterization would involve G&G surveys, and the construction, operation and decommissioning of seven meteorological towers. During site characterization, birds may be affected by vessel discharges and collisions with the proposed meteorological tower.

Discharge of Liquid Wastes, Hazardous Materials, Solid Wastes, or Fuel

Marine and coastal birds could be exposed to operational discharges or accidental fuel releases from construction sites and construction vessels and to accidentally released solid debris. Many species of marine birds (such as gulls) often follow ships and forage in their wake on fish and other prey injured or disoriented by the passing vessel. In doing so, these birds may be affected by discharges of waste fluids (such as bilge water) generated by the vessels. Operational discharges from construction vessels would be released into the open ocean where they would be rapidly diluted and dispersed, or collected and taken to shore for treatment and disposal. Sanitary and domestic wastes would be processed through on-site waste treatment facilities before being discharged overboard. Deck drainage would also be processed prior to discharge. Thus, impacts to marine and coastal birds from waste discharges from construction vessels are expected to be negligible. Marine and coastal birds may become entangled in or ingest floating, submerged, and beached debris (Heneman and the Center for Environmental Education 1988; Ryan 1987, 1990).

Entanglement may result in strangulation, the injury or loss of limbs, entrapment, or the prevention or hindrance of the ability to fly or swim, and all of these effects may be considered lethal. Ingestion of debris may irritate, block, or perforate the digestive tract, suppress appetite, impair digestion of food, reduce growth, or release toxic chemicals (Dickerman and Goelet, 1987; Ryan 1988; Derraik, 2002).

The discharge or disposal of solid debris into offshore waters from OCS structures and vessels is prohibited by the USCG (MARPOL, Annex V, Public Law 100-220 [101 Statute 1458]). Thus, entanglement in or ingestion of OCS-related trash and debris by marine and coastal birds is not expected, and impacts to marine and coastal birds would be negligible. Because of the very limited amount of vessel traffic and construction activity that might occur with construction and operation of a meteorological tower, the release of wastes, debris, hazardous materials, or fuels would occur infrequently and cease following completion of the G&G surveys, meteorological tower construction, and meteorological tower decommissioning. The likelihood of an accidental fuel release would also be limited to the active construction and decommissioning periods of the site characterization.

Presence of Meteorological Towers

It has been estimated that hundreds of millions of birds are killed each year in collisions with communication towers, windows, electric transmission lines, and other structures (see Klem, 1989 and 1990; Dunn, 1993; Shire et al., 2000). It is possible that some birds may collide with the meteorological towers and be injured or killed. Because of the small number of meteorological towers proposed and

there distance offshore, potential impacts to marine and coastal birds from collisions would be minor. Under good weather conditions, most migratory species in the vicinity of the proposed lease areas (at least 8-17 miles from shore) would be flying at an altitude higher than the proposed meteorological towers. Of the migratory species present in the vicinity of the proposed lease areas, terns may fly below the height of the proposed meteorological towers (90-100 meters) and would be the most likely to perch on the proposed structures. Four tern species regularly nest in New Jersey: Common, Forsters, Least, and Gull-billed, although other species that do not breed in New Jersey (Roseate, Black, Arctic, Sandwich, Royal and Caspian) can be found at the tern colonies in New Jersey (Walsh et al., 1999). Due to the small number of proposed structures located over a large distance (about 80 miles), the proposed action itself is not expected to significantly affect migration of migrating terns. Lattice towers, and to lesser extent monopoles, would provide perching opportunities. It is possible that the proposed structures would train migrating terns to use the proposed lease area for foraging. This may be an issue if commercial wind energy projects were later constructed in the same area as the proposed action. However, an environmental review of a proposed commercial wind energy project in the same area would thoroughly examine the effects of such a project on birds, especially threatened and endangered species.

Under poor visibility conditions, all migratory species in the vicinity have the potential to encounter one of the proposed meteorological towers. Due to the small number of proposed structures located over a large distance, migratory birds colliding with the proposed meteorological towers is possible but unlikely.

Bald and Golden Eagles

Since bald and golden eagles migrate and forage over land and inland water bodies rather than the open ocean, and the meteorological towers proposed would be at least eight miles offshore, the meteorological towers and activities within the proposed lease areas would not affect these eagles. Because the proposed action would not require expansion of existing onshore facilities and the limited number of vessel trips in coastal waters, impacts to bald or golden eagle habitat would not be expected.

Mitigation Measures

The proposed Reduction or Elimination of the Potential for Adverse Impacts to Birds and Bats Stipulation (see Appendix A.7) would reduce the potential impacts the presence of meteorological towers pose on birds by requiring the use of anti-perching devices, imposing lighting restrictions, and prohibiting the use of guy wires.

The use of perch deterrent devices has discouraged terns perching on the fence and deck of the platforms supporting the Cape Wind meteorological tower, the only existing meteorological tower in Federal waters. Lattice towers provide greater opportunities for birds to roost (especially terns, gulls and peregrine falcons). Although there is no scientific data to support this hypothesis, it is possible that lattice towers could “train” birds to roost at these offshore sites, which could lead to problems if turbines are subsequently constructed in the same area. Even monopole towers have service platforms, and unless anti-perching devices are used, they would also provide perching opportunities. To prevent “training” birds to use the proposed lease areas as roosting areas, the proposed stipulation would require lessees to use anti-perching devices to the extent possible.

Conclusion

While birds may be affected by vessel discharges and the presence of meteorological towers, accidental fuel release is unlikely and the risk of collision would be minor due to the small number of meteorological towers proposed and their distance offshore. The proposed mitigation measures would reduce or eliminate the potential for effects from the presence of meteorological towers on birds. Therefore, the proposed action is not expected significantly impact marine and coastal birds, including ESA-listed and migratory birds.

4.1.2.6 Bats

4.1.2.6.1 Description of the Affected Environment

Species of bats that currently or historically occur in Delaware and/or New Jersey are detailed in Table 4-4. Six of these species usually inhabit caves and/or mines during all or part of the year, referred to as cave bats. The remaining five species (silver-haired bat, eastern red bat, hoary bat, evening bat, and northern yellow bat) seldom enter caves or mines, and are referred to as tree bats (Harvey, 2000). The one endangered cave bat species, Indiana bat, is located in the northern region of New Jersey with a population of 652 in 2005 and a number of hibernacula with extant winter populations totaling two (USFWS, 2007b). The number of hibernacula in Delaware is unknown. The eastern small-footed bat, also a cave bat, is a species of special concern.

The silver-haired bat, eastern red bat, and hoary bat are considered the migratory tree bats in North America due to their seasonal migrations over several degrees of latitude (Cryan, 2003). These three species are part-time residents in New Jersey from spring through fall when winter migration to southern states occurs (NJDEP, Division of Fish and Wildlife, 2005). Exact migration or dispersal corridors in the project area are unknown. Bats are often observed foraging over surface waters such as ponds, lakes, wetlands, streams, and rivers, where they feed on adult aquatic insects such as mosquitoes, gnats, mayflies, and damselflies. Generally, bats are not associated with saline habitats.

Although the migration patterns of bats are not well-documented, many bats species make extensive use of linear features in the landscape, such as ridges of rivers while commuting and migrating, which may indicate a preference for overland migration routes.

Bat migration over the open seas has been documented but it is uncommon and poorly understood. Information with regards to bat species found in the Northeast and the associated migration routes is limited. Albeit uncommon, bats are documented and have been found over the oceans throughout the world during migrant periods (August through October). Bat migration and associated migration corridors for bats are poorly understood. The difficulty in studying long distant bat migration is locating places to observe bats that are actively migrating (Cryan and Brown, 2007). Bats can migrate short and long distances locating winter hibernacula or wintering grounds, depending on the species, with tree roosting bats being the common long distant migrant. These species have been documented over large bodies of water, including the Great Lakes and open sea. The eastern red bat has been noted flying over the Atlantic Ocean (Texas Parks and Wildlife Department, 2008). Additional studies have seen the migration of the hoary bat roosting on Southeast Farallon Island, approximately 48 km west of San Francisco (Cryan and Brown, 2007). Since there are no island habitats in the project area, it is unlikely that bat species would be initially foraging or migrating through the area.

Additional information or a more detailed analysis and migration descriptions of bats can be found in the Cape Wind Energy Project DEIS (USDOJ, MMS, 2008a) and the Programmatic EIS.

Table 4-4. Bats potentially located within Delaware and New Jersey¹

Delaware	
Common	Unknown Status
Big Brown Bat (<i>Eptesicus fuscus</i>)	Silver-haired Bat (<i>Lasionycteris noctivagans</i>)
Little Brown Bat (<i>Myotis lucifugus</i>)	Eastern Red Bat (<i>Lasiurus borealis</i>)
Eastern Pipistrelle Bat (<i>Pipistrellus subflavus</i>)	Hoary Bat (<i>Lasiurus cinereus</i>)
	Eastern Small-footed Bat (<i>Myotis leibii</i>) ³
	Northern Long-eared Bat (<i>Myotis septentrionalis</i>)
	Evening Bat (<i>Nycticeius humeralis</i>)
New Jersey	
Common	Uncommon
Big Brown Bat (<i>Eptesicus fuscus</i>)	Hoary Bat (<i>Lasiurus cinereus</i>)
Silver-haired Bat (<i>Lasionycteris noctivagans</i>)	Eastern Small-footed Bat (<i>Myotis leibii</i>) ³
Eastern Red Bat (<i>Lasiurus borealis</i>)	Indiana Bat (<i>Myotis sodalis</i>) ²
Little Brown Bat (<i>Myotis lucifugus</i>)	Northern Yellow Bat (<i>Lasiurus intermedius</i>)
Northern Long-eared Bat (<i>Myotis septentrionalis</i>)	
Eastern Pipistrelle Bat (<i>Pipistrellus subflavus</i>)	

¹NJ Division of Fish & Wildlife (2004); DNREC, Division of Fish & Wildlife (1999); Williams et al. (2002).

²Endangered (March 11, 1967)

³Species of Special Concern

4.1.2.6.2 Impact Analysis of the Proposed Action

Under Alternative A, all seven proposed leases would be issued and up to seven meteorological towers would be constructed and operated for up to five years. Only the silver-haired bat, eastern red bat, and hoary bat would possibly forage or migrate through the proposed action area. While their presence in the proposed action area is unlikely, potential impacts to these bats include avoidance or attraction responses to the structures due to noise, lighting, and the visual presence; and collisions with structures.

Routine Activities

Based on the above information, the small scale nature of the projects, and the lack of a land mass or vegetation 8-17 miles offshore for bat roosting, the presence of bats in the area is unlikely and impacts are not expected during surveying, construction, operation, or decommissioning.

Any impacts from construction noise on these species would be short-term and temporary. Noise effects could include avoidance or attraction responses to structures because of noise, but such effects would be difficult to distinguish from similar effects from lighting or the visual presence of the structures.

Little is known about the relationship of bats and barotrauma at turbine blades. However, the small wind turbines charging batteries on the proposed meteorological towers would be approximately 50 inches in rotor diameter and would not be expected to impact bats.

In addition to collecting meteorological and oceanographic data, these meteorological towers would assist in conducting biological studies, including monitoring of bats, to aid in future environmental assessments of OCS activities.

Non-Routine Events

Because of the proposed meteorological towers distance from shore and the likely very limited abundance of flying insects at the proposed locations, bats would not be expected to forage near the

proposed meteorological towers. Bats are also not expected to migrate over OCS waters, since such flights would be more closely associated with the shoreline, well away from the proposed meteorological towers. However, migrating bats may on occasion be driven to offshore OCS waters by prevailing winds and weather. While the frequency of bat displacement to OCS waters is unknown, bats affected in this manner could encounter the proposed lease areas. The land-based roosting, breeding, and foraging behavior of bats, as well as their limited home ranges and echolocation sensory systems, suggest that the risk of collision with the proposed meteorological towers in OCS waters is minor.

Proposed Mitigation Measures

The proposed Reduction or Elimination of the Potential for Adverse Impacts to Birds and Bats Stipulation (see Appendix A.7) would reduce or eliminate the potential impacts the presence of meteorological towers pose on bats by requiring the use of anti-perching devices, imposing lighting restrictions, and prohibiting the use of guy wires.

Conclusion

While it is unlikely that bat species would be foraging or migrating through the area, these mammals may on occasion be driven to the project area by prevailing winds and weather. If present avoidance or attraction responses to the structures because of noise, lighting, and the visual presence could occur. The risk of collision is minor. Mitigation measures including the use of anti-perching devices, lighting restrictions, and prohibition on guy wires would further reduce or eliminate potential impacts on bats. Because of the distance between the proposed leases, there would be no additive effect of constructing all seven proposed meteorological towers on bats. The proposed data collection activities may assist in future environmental analyses of impacts of OCS activities on bats.

4.1.2.7 Fish Resources and Essential Fish Habitat

4.1.2.7.1 Description of the Affected Environment

4.1.2.7.1.1 Fisheries

In Delaware and New Jersey a large variety of marine species are recreationally fished. The species taken in the greatest number based on 2007 statistics include bluefish, dogfish, Atlantic croaker, summer flounder, black sea bass, striped bass, and tautog. The combined number of catches reported by recreational fishers in the two States was slightly greater than 38.5 million in 2007 (USDOC, NOAA Fisheries, Office of Science and Technology, 2008).

The estimated size and value of the commercial fish landings in New Jersey in 2007 was over 153 million pounds, valued at over \$152.4 million. The largest volume and value fisheries in 2007 included menhaden, goosfish, Atlantic herring, Atlantic surf clam, ocean quahog clam, sea scallop, blue crab, longfin squid, and Atlantic mackerel. The estimated value of for 2007 for marine commercial fisheries in Delaware was over 5 million pounds valued at about \$7.6 million. The most important fisheries by volume and value in Delaware included striped bass, blue crab, horseshoe crab, and knobbed whelk (USDOC, NOAA Fisheries, Office of Science and Technology, 2008; USDOC, NOAA Fisheries, Office of Science and Technology, 2009b).

4.1.2.7.1.2 Essential Fish Habitat

The Fishery Conservation and Management Act (FCMA) requires fishery management councils to: (1) describe and identify EFH in their respective regions, (2) specify actions to conserve and enhance that EFH, and (3) minimize the adverse effects of fishing on EFH. The Act requires Federal agencies to consult on activities that may adversely affect EFH designated in fishery management plans. Marine fish and invertebrates depend on healthy habitats to survive and reproduce. Throughout their lives, these organisms use many types of habitats including seagrass, salt marsh, coral reefs, rocky intertidal areas,

and hard/live bottom areas, among others. Various activities on land and in the water may threaten to alter, damage, or destroy these habitats, thereby affecting the fishery resources that utilize them. As mandated by the Magnuson Fishery Conservation and Management Act, the MMS is consulting with NMFS on possible and potential impacts from the proposed action on EFH. For that consultation, the MMS prepared an EFH assessment with detailed species descriptions, which this EA incorporates by reference (USDOJ, MMS, 2008c). Chapter 4.2.11.3 of the Programmatic EIS also provides information on EFH in the Atlantic.

In addition to designating EFH, the NMFS requires fishery management councils to identify habitat areas of particular concern (HAPCs) within fishery management plans. HAPCs are discrete subsets of EFH that provide extremely important ecological functions or are especially vulnerable to degradation.

Habitats of Particular Concern have been designated for the sandbar shark in four areas along the Atlantic Coast. These areas were designated because they are important pupping and nursery grounds. The HAPCs include the mouth of Great Bay, New Jersey and the lower and middle Delaware Bay (USDOC, NMFS, 2006). One of the seven proposed meteorological tower sites (see Table 4-7) would be located in a sandbar shark HAPC.

The EFH has been specifically designated for the following 35 species in the affected lease blocks (see Tables 4-5 to 4-11 for the specific species and life stages that could potentially be affected at the seven sites excluding skate species; USDOC, NOAA Fisheries, Habitat Conservation Division, 2008). In addition, the EFH for four skate species could potentially overlap with some of the sites (USDOC, NOAA Fisheries, Habitat Conservation Division, 2008).

Table 4-5. Summary of Essential Fish Habitat Designation for Block Number 6451, Proposed by Bluewater

Species	Eggs	Larvae	Juveniles	Adults
whiting (<i>Merluccius bilinearis</i>)	X	X	X	
red hake (<i>Urophycis chuss</i>)	X	X		
windowpane flounder (<i>Scopthalmus aquosus</i>)	X	X		X
Atlantic sea herring (<i>Clupea harengus</i>)				X
monkfish (<i>Lophius americanus</i>)	X	X		
bluefish (<i>Pomatomus saltatrix</i>)		X		X
summer flounder (<i>Paralichthys dentatus</i>)		X		X
scup (<i>Stenotomus chrysops</i>)	n/a	n/a	X	X
black sea bass (<i>Centropristus striata</i>)	n/a	X		X
surf clam (<i>Spisula solidissima</i>)	n/a	n/a	X	X
spiny dogfish (<i>Squalus acanthias</i>)	n/a	n/a	X	X
king mackerel (<i>Scomberomorus cavalla</i>)	X	X	X	X
Spanish mackerel (<i>Scomberomorus maculatus</i>)	X	X	X	X
cobia (<i>Rachycentron canadum</i>)	X	X	X	X
blue shark (<i>Prionace glauca</i>)			X	X
white shark (<i>Charcharodon carcharias</i>)			X	
tiger shark (<i>Galeocerdo cuvieri</i>)		X	X	
dusky shark (<i>Charcharinus obscurus</i>)		X	X	
sandbar shark (<i>Charcharinus plumbeus</i>)		X	X	X
shortfin mako shark (<i>Isurus oxyrhyncus</i>)		X	X	X
bluefin tuna (<i>Thunnus thynnus</i>)			X	X
skipjack tuna (<i>Katsuwonus pelamis</i>)				X
swordfish (<i>Xiphias gladius</i>)			X	

Source: USDOC, NOAA, 2008b.

Table 4-6. Summary of Essential Fish Habitat Designation for Block Number 6738, Proposed by Deepwater

Species	Eggs	Larvae	Juveniles	Adults
red hake (<i>Urophycis chuss</i>)	X	X		
witch flounder (<i>Glyptocephalus cynoglossus</i>)	X	X		
yellowtail flounder (<i>Pleuronectes ferruginea</i>)	X	X		
windowpane flounder (<i>Scophthalmus aquosus</i>)	X	X		X
Atlantic sea herring (<i>Clupea harengus</i>)			X	X
monkfish (<i>Lophius americanus</i>)	X	X		
bluefish (<i>Pomatomus saltatrix</i>)	X		X	X
long finned squid (<i>Loligo pealei</i>)	n/a	n/a	X	
summer flounder (<i>Paralichthys dentatus</i>)	X	X		X
scup (<i>Stenotomus chrysops</i>)	n/a	n/a		X
black sea bass (<i>Centropristus striata</i>)	n/a			X
surf clam (<i>Spisula solidissima</i>)	n/a	n/a	X	X
spiny dogfish (<i>Squalus acanthias</i>)	n/a	n/a	X	X
king mackerel (<i>Scomberomorus cavalla</i>)	X	X	X	X
Spanish mackerel (<i>Scomberomorus maculatus</i>)	X	X	X	X
cobia (<i>Rachycentron canadum</i>)	X	X	X	X
blue shark (<i>Prionace glauca</i>)			X	X
dusky shark (<i>Charcharinus obscurus</i>)		X		
sandbar shark (<i>Charcharinus plumbeus</i>)		X	X	X
shortfin mako shark (<i>Isurus oxyrhyncus</i>)		X	X	X
tiger shark (<i>Galeocerdo cuvieri</i>)		X	X	
bluefin tuna (<i>Thunnus thynnus</i>)			X	X
skipjack tuna (<i>Katsuwonus pelamis</i>)				X
swordfish (<i>Xiphias gladius</i>)			X	

Source: USDOC, NOAA, 2008b.

Table 4-7. Summary of Essential Fish Habitat Designation for Block Number 6931, Proposed by FERN

Species	Eggs	Larvae	Juveniles	Adults
Atlantic cod (<i>Gadus morhua</i>)				X
red hake (<i>Urophycis chuss</i>)	X	X	X	
witch flounder (<i>Glyptocephalus cynoglossus</i>)	X			
yellowtail flounder (<i>Pleuronectes ferruginea</i>)	X	X		
windowpane flounder (<i>Scopthalmus aquosus</i>)	X	X	X	X
Atlantic sea herring (<i>Clupea harengus</i>)				X
monkfish (<i>Lophius americanus</i>)	X	X		
bluefish (<i>Pomatomus saltatrix</i>)	X		X	X
summer flounder (<i>Paralichthys dentatus</i>)	X	X	X	X
scup (<i>Stenotomus chrysops</i>)	n/a	n/a	X	X
black sea bass (<i>Centropristus striata</i>)	n/a		X	X
surf clam (<i>Spisula solidissima</i>)	n/a	n/a	X	X
spiny dogfish (<i>Squalus acanthias</i>)	n/a	n/a		X
king mackerel (<i>Scomberomorus cavalla</i>)	X	X	X	X
Spanish mackerel (<i>Scomberomorus maculatus</i>)	X	X	X	X
cobia (<i>Rachycentron canadum</i>)	X	X	X	X
dusky shark (<i>Charcharinus obscurus</i>)		X		
sandbar shark (<i>Charcharinus plumbeus</i>)		X	X	X
sandbar shark (<i>Charcharinus plumbeus</i>)		HAPC	HAPC	HAPC
shortfin mako shark (<i>Isurus oxyrhyncus</i>)			X	
tiger shark (<i>Galeocerdo cuvieri</i>)		X	X	
bluefin tuna (<i>Thunnus thynnus</i>)			X	

Source: USDOC, NOAA, 2008b.

Table 4-8. Summary of Essential Fish Habitat Designation for Block Number 6936, Proposed by Bluewater

Species	Eggs	Larvae	Juveniles	Adults
whiting (<i>Merluccius bilinearis</i>)	X	X	X	
red hake (<i>Urophycis chuss</i>)	X	X		
witch flounder (<i>Glyptocephalus cynoglossus</i>)	X	X		
winter flounder (<i>Pleuronectes americanus</i>)	X	X	X	X
yellowtail flounder (<i>Pleuronectes ferruginea</i>)	X	X		X
windowpane flounder (<i>Scophthalmus aquosus</i>)	X	X	X	X
Atlantic sea herring (<i>Clupea harengus</i>)			X	X
bluefish (<i>Pomatomus saltatrix</i>)		X		X
long finned squid (<i>Loligo pealei</i>)	n/a	n/a	X	
summer flounder (<i>Paralichthys dentatus</i>)			X	X
scup (<i>Stenotomus chrysops</i>)	n/a	n/a	X	X
black sea bass (<i>Centropristus striata</i>)	n/a	X	X	X
surf clam (<i>Spisula solidissima</i>)	n/a	n/a	X	X
spiny dogfish (<i>Squalus acanthias</i>)	n/a	n/a		X
king mackerel (<i>Scomberomorus cavalla</i>)	X	X	X	X
Spanish mackerel (<i>Scomberomorus maculatus</i>)	X	X	X	X
cobia (<i>Rachycentron canadum</i>)	X	X	X	X
blue shark (<i>Prionace glauca</i>)			X	X
dusky shark (<i>Charcharinus obscurus</i>)		X		
sandbar shark (<i>Charcharinus plumbeus</i>)		X	X	X
shortfin mako shark (<i>Isurus oxyrhyncus</i>)		X	X	X
tiger shark (<i>Galeocerdo cuvieri</i>)		X	X	
bluefin tuna (<i>Thunnus thynnus</i>)			X	X
skipjack tuna (<i>Katsuwonus pelamis</i>)				X
swordfish (<i>Xiphias gladius</i>)			X	

Source: USDOC, NOAA, 2008b.

Table 4-9. Summary of Essential Fish Habitat Designation for Block Number 7033, Proposed by Deepwater

Species	Eggs	Larvae	Juveniles	Adults
Atlantic cod (<i>Gadus morhua</i>)				X
whiting (<i>Merluccius bilinearis</i>)	X	X	X	
red hake (<i>Urophycis chuss</i>)	X	X		
witch flounder (<i>Glyptocephalus cynoglossus</i>)	X			
yellowtail flounder (<i>Pleuronectes ferruginea</i>)	X	X		
windowpane flounder (<i>Scopthalmus aquosus</i>)	X	X		X
Atlantic sea herring (<i>Clupea harengus</i>)			X	X
bluefish (<i>Pomatomus saltatrix</i>)	X	X		X
long finned squid (<i>Loligo pealei</i>)	n/a	n/a	X	
summer flounder (<i>Paralichthys dentatus</i>)				X
scup (<i>Stenotomus chrysops</i>)	n/a	n/a	X	X
black sea bass (<i>Centropristus striata</i>)	n/a	X	X	
surf clam (<i>Spisula solidissima</i>)	n/a	n/a	X	X
ocean quahog (<i>Artica islandica</i>)	n/a	n/a		X
spiny dogfish (<i>Squalus acanthias</i>)	n/a	n/a	X	X
king mackerel (<i>Scomberomorus cavalla</i>)	X	X	X	X
Spanish mackerel (<i>Scomberomorus maculatus</i>)	X	X	X	X
cobia (<i>Rachycentron canadum</i>)	X	X	X	X
blue shark (<i>Prionace glauca</i>)				X
dusky shark (<i>Charcharinus obscurus</i>)		X		
sandbar shark (<i>Charcharinus plumbeus</i>)		X	X	X
shortfin mako shark (<i>Isurus oxyrhyncus</i>)		X	X	X
tiger shark (<i>Galeocerdo cuvieri</i>)		X	X	
bluefin tuna (<i>Thunnus thynnus</i>)			X	X
skipjack tuna (<i>Katsuwonus pelamis</i>)				X
swordfish (<i>Xiphias gladius</i>)			X	

Source: USDOC, NOAA, 2008b.

Table 4-10. Summary of Essential Fish Habitat Designation for Block Number 7131, Proposed by Bluewater

Species	Eggs	Larvae	Juveniles	Adults
Atlantic cod (<i>Gadus morhua</i>)				X
whiting (<i>Merluccius bilinearis</i>)	X	X	X	
red hake (<i>Urophycis chuss</i>)	X	X	X	
winter flounder (<i>Pleuronectes americanus</i>)	X	X	X	X
windowpane flounder (<i>Scophthalmus aquosus</i>)	X		X	X
Atlantic sea herring (<i>Clupea harengus</i>)			X	X
monkfish (<i>Lophius americanus</i>)	X	X		
bluefish (<i>Pomatomus saltatrix</i>)			X	X
Atlantic butterfish (<i>Peprilus triacanthus</i>)			X	
Atlantic mackerel (<i>Scomber scombrus</i>)				X
summer flounder (<i>Paralichthys dentatus</i>)			X	X
scup (<i>Stenotomus chrysops</i>)	n/a	n/a	X	X
black sea bass (<i>Centropristus striata</i>)	n/a		X	X
surf clam (<i>Spisula solidissima</i>)	n/a	n/a	X	X
ocean quahog (<i>Artica islandica</i>)	n/a	n/a	X	
spiny dogfish (<i>Squalus acanthias</i>)	n/a	n/a	X	X
king mackerel (<i>Scomberomorus cavalla</i>)	X	X	X	X
Spanish mackerel (<i>Scomberomorus maculatus</i>)	X	X	X	X
cobia (<i>Rachycentron canadum</i>)	X	X	X	X
blue shark (<i>Prionace glauca</i>)				X
Atlantic angel shark (<i>Squatina dumerili</i>)		X	X	
blue shark (<i>Prionace glauca</i>)				X
dusky shark (<i>Charcharinus obscurus</i>)		X		
sandbar shark (<i>Charcharinus plumbeus</i>)		X	X	X
shortfin mako shark (<i>Isurus oxyrhincus</i>)		X	X	X
tiger shark (<i>Galeocerdo cuvieri</i>)		X	X	
bluefin tuna (<i>Thunnus thynnus</i>)			X	X
skipjack tuna (<i>Katsuwonus pelamis</i>)				X
swordfish (<i>Xiphias gladius</i>)			X	

Source: USDOC, NOAA, 2008b.

Table 4-11. Summary of Essential Fish Habitat Designation for Block Number 6325, Proposed by Bluewater

Species	Eggs	Larvae	Juveniles	Adults
Atlantic cod (<i>Gadus morhua</i>)				X
red hake (<i>Urophycis chuss</i>)	X	X	X	
windowpane flounder (<i>Scopthalmus aquosus</i>)	X	X	X	X
Atlantic sea herring (<i>Clupea harengus</i>)				X
monkfish (<i>Lophius americanus</i>)	X	X		
bluefish (<i>Pomatomus saltatrix</i>)	X	X	X	X
Atlantic butterfish (<i>Peprilus triacanthus</i>)	X		X	
summer flounder (<i>Paralichthys dentatus</i>)		X	X	X
scup (<i>Stenotomus chrysops</i>)	n/a	n/a	X	X
black sea bass (<i>Centropristus striata</i>)	n/a	X	X	X
surf clam (<i>Spisula solidissima</i>)	n/a	n/a	X	X
king mackerel (<i>Scomberomorus cavalla</i>)	X	X	X	X
Spanish mackerel (<i>Scomberomorus maculatus</i>)	X	X	X	X
cobia (<i>Rachycentron canadum</i>)	X	X	X	X
sand tiger shark (<i>Odontaspis taurus</i>)		X		X
blue shark (<i>Prionace glauca</i>)				X
Atlantic angel shark (<i>Squatina dumerili</i>)		X	X	X
Atl. sharpnose shark (<i>Rhizopriondon terraenovae</i>)				X
dusky shark (<i>Charcharinus obscurus</i>)		X		
sandbar shark (<i>Charcharinus plumbeus</i>)		X	X	X
shortfin mako shark (<i>Isurus oxyrhyncus</i>)		X	X	X
scalloped hammerhead shark (<i>Sphyrna lewini</i>)			X	
tiger shark (<i>Galeocerdo cuvieri</i>)		X	X	
bluefin tuna (<i>Thunnus thynnus</i>)			X	X
swordfish (<i>Xiphias gladius</i>)			X	

Source: USDOC, NOAA, 2008b.

4.1.2.7.2 Impact Analysis of the Proposed Action

Noise and Disturbance

Chapter 5.2.11.2 of the Programmatic EIS discusses the impacts of site characterization on fish resources and EFH.

Activities that could affect fish resources during site characterization include the presence of survey vessels, the performance of surveys to identify the presence of sensitive species and habitats, G&G surveys, and drilling and core sampling to evaluate the underlying geological conditions. Most fish are presumed to be able to detect, with varying degrees of sensitivity, the frequency range of sounds that would be produced by site characterization activities. Sounds have a potential to mask the sounds normally used by some fishes for communication or foraging. Continuous, long-term exposure to high-pressure sound waves from air guns has been shown to cause damage to the hair cells of the ears of some fishes when the fish were prevented from escaping the immediate vicinity of the air-gun discharges (Popper, 2003). Although the indirect impacts of noise exposure on the fecundity and survival of fishes is not certain, fishes with impaired hearing may have reduced survival if the ability to locate prey, avoid predators, or communicate with other fishes is affected (Popper, 2003). Due to attenuation of the associated pressure waves, the probability of hearing impairment decreases as the distance between a fish and the noise source increases (Thomson and Davis, 2001) and movements to avoid areas with intense sound sources could allow fish to avoid damage to hearing structures under natural conditions (Popper, 2003). Loud sounds could cause fishes near a sound source to change their behavior (Pearson et al., 1992), and resulting movements by some species to avoid areas with excessive levels of noise could temporarily alter the distribution of fish within the area.

Site Assessment Surveys

It is assumed that a project-specific G&G survey would cover the area being considered for an offshore wind facility to identify potential placement locations based on topographic features and to determine the appropriate types of foundations for the conditions that are present. The size of the surveyed area would be project specific.

Further, it is assumed that there would be no need to conduct multiple surveys within the project area. Although it is possible that sounds from low-energy G&G devices such as echosounders or side-scan sonar devices could temporarily affect fish behavior, it is believed that there would be no detrimental effects on fishes or invertebrates; in fact, such devices are commonly used to map fish habitats and detect aggregations of some fish species. In addition to noise from G&G surveys, there would also be noise generated by other activities during the site characterization phase. Sound sources could include drilling noises associated with geological characterization (e.g., core sampling), noises from vessels associated with surveys or movement of materials and personnel, and noises from construction and placement of meteorological towers. Noises associated with core sampling would likely be short-lived and localized but could temporarily disturb or displace individual fish. For each project, one vessel would be required each day to transport personnel needed to construct meteorological towers, and construction could take up to 10 weeks depending on the number of towers needed to adequately characterize an area. Movement of construction materials for the meteorological tower could require several round-trips of a barge to the project area.

The G&G surveys could require a single vessel within the project area daily for up to one month. Overall, noise associated with these activities would have no detectable or persistent effects on fish resources.

Construction

Pile drivers would likely be used to install pilings for meteorological towers. For the Cape Wind meteorological tower, the noise from pile driving ranged from 145 to 167 dB at a distance of

approximately 500 meters (1,640 feet). Thomsen et al. (2006) reported that it typically takes at least 1 to 2 hour to drive one piling into the bottom. Therefore, it can be assumed that the total time for pile-driving noises for each meteorological tower would require between 6 and 8 h, occurring intermittently over an estimated 3-day period. Based on analysis of construction noise for offshore wind generation, noise from pile-driving activities could be detected by fish for many kilometers from the source (Thomsen et al., 2006). Fish may temporarily move away from noise sources until work has been completed, although some individual fish could be harmed or killed by noise from pile-driving activities (Hastings and Popper, 2005).

Immediate or delayed mortality of fish from pile-driving activities has reportedly been observed at 10 to 30 meters (33 to 98 feet) from the source (depending upon the size of the hammer used), and it is estimated that delayed mortality could occur 150 to 1,000 meters (492 to 3,280 feet) from the source, although this remains somewhat speculative (Thomsen et al., 2006). The potential for impacts to fish populations from such losses is unclear, although it is unlikely that effects on fish populations would be detectable. Recovery would likely occur shortly following installation of pilings.

The placement of meteorological towers in offshore areas would require the transportation of components and personnel by barge or other vessels. Although noise generated by vessel traffic could potentially affect behavior of some fish resources, impacts from the small number of vessel trips required would be expected to be negligible.

Operations

The servicing of meteorological towers in offshore areas would require the transportation of components and personnel by barge or other vessels. Although noise generated by vessel traffic could potentially affect behavior of some fish resources, impacts from the small number of vessel trips required would be expected to be negligible.

Decommissioning

The cutting of the piles and their subsequent removal by barge or other vessels would produce noise that could disturb fish in the immediate vicinity. Disturbance effects are expected to be negligible.

Water Quality

Construction activities associated with installing the foundations and any scour control mats or rock armor would result in temporary, localized increases in suspended solids in the water column. Decommissioning impacts are expected to be similar to those of construction. Increased turbidity can: interfere with behaviors like foraging for mobile species, impede respiration of sessile or limited mobility species that could not move out the affected area; and adversely affect demersal eggs if they were buried as the sediments settled out. Localized turbidity is expected to be minimal due to the nature of the substrate, the limited area of activity and the use of technologies that minimize sediment disturbance. The overall effect on EFH is expected to negligible to minor.

Loss and Disturbance of Habitat

A 3-pile foundation structure for a meteorological tower can cover an area of ocean floor of approximately 85 m² (900 ft²). For seven structures this could be up to 595m² (6300 ft²). Installation and decommissioning would result in disturbance to a wider area of the seafloor but any disturbances would be of limited areal and temporal extent. Demersal eggs and larvae that lie within the direct footprint of the construction disturbance would likely be destroyed. This could include areas impacted by anchoring during construction. Shellfish species with limited mobility may also be directly killed.

As discussed in Chapter 3.1.2.1 of this EA, given the shallow waters depths of Block 6325, sediments in this area are likely to be subject to wave base interaction causing sediment transport and bedform modification. The remaining proposed lease areas are located in deeper waters, outside of the realm of wave base interaction and will therefore experience altering of continental shelf sediments by wave action

only during storm waves and surges. If scouring does occur, displaced sediment could impact benthic communities by direct burying, interfering with respiration and reducing the ability of fish to locate prey in an area slightly larger than the footprint of the structures.

Assuming that especially uncommon or sensitive benthic habitats (Chapter 4.1.2.2 of this EA) are avoided, impacts to food resources or habitats for demersal fish would be minor. The proposed towers would be in operation for 2-5 years. During removal, the piles would be cut and removed at a depth of at least 4.6 meters (15 feet) below the seabed. Disturbance of the seabed during such operations would represent negligible impacts considering the expanse of similar seafloor habitats likely to be present in the vicinity. In general, the disturbance of the benthic environment from construction would be short-term and localized since many species are capable of recolonizing benthic sediments after disturbance. From a review of the available studies it appears that recovery to background levels occurs within 3 months to 2.5 years (Brooks et al., 2006). After structural removal the complete site would be available for recolonization. The impacts from the loss and disturbance to EFH would likely be minor.

Risk of Spills

Fuel spills could occur during all phases (assessment, construction, operations, decommissioning) as a result of vessel accidents or leaks. Spilled fuels affecting areas important for supporting fish resources (e.g., nursery areas) could result in impacts to some fish resources by causing injury or mortality of fishes or their prey. Overall, the likelihood of such spills is relatively low because of the small number of trips that would be required. If spills occurred, the volume of fuel that could be spilled by vessels associated with the proposed action activities would be small, and thus relatively small areas would be affected. Because such spills would be unlikely to measurably affect fish populations and because recovery would likely occur within one or two seasons, impacts to fish resources or EFH would be negligible to minor.

Reef Effect

Vertical structures in the marine environment can attract fish and invertebrates, primarily because they offer more places for attachment. The three options for supporting structures: a monopile, a 3-pile structure (tripod), and a steel jacket foundation have increasing surface areas for attachment. Fish attraction to the meteorological towers is not expected to be marked since each would be a single structure, with less complexity than true artificial reefs.

Any reef effect would be lost at decommissioning. This short-term increase in attachment sites would be lost. Any minor beneficial effects during operation would be lost at decommissioning. The positive and negative effects to EFH of the small amount of extra hard surface habitat would be negligible.

Proposed Mitigation Measures

The following mitigation measures have been proposed to reduce potential impacts of noise from pile driving on fish and accidental loss of trash and debris on EFH:

- The proposed Reduction or Elimination of the Potential for Adverse Impacts from Pile Driving Stipulation (see Appendix A.4) would reduce or eliminate potential impacts of noise on fish by requiring the use of vibratory hammers rather than impact hammers to the extent possible, and if impact hammers are used, would require monitoring and implementation of “soft starts”; and
- The proposed Marine Trash and Debris Awareness and Elimination Stipulation (see Appendix A.6) would reduce or eliminate potential impacts on water quality.

Conclusion

Due to the small number of vessel trips and limited construction required, noise associated with siting, construction, operation and decommissioning activities would have no detectable or persistent effects on fish resources. Localized turbidity is expected to be minimal due to the nature of the substrate, the limited area of activity and the use of technologies that minimize sediment disturbance. Fish

attraction to the meteorological towers is not expected to be marked since each would be a single structure, with less complexity than true artificial reefs. The positive and negative effects to EFH of the small amount of extra hard surface habitat would be negligible and be lost at decommissioning. The proposed mitigation measures would reduce potential impacts of noise from pile driving on fish and accidental loss of trash and debris on EFH

4.1.3 Socioeconomic Resources

4.1.3.1 Offshore Cultural Resources

4.1.3.1.1 Description of the Affected Environment

Due to the distance of the proposed lease areas from shore (Chapter 3.1.4.2 of this EA) and that no new coastal infrastructure is proposed (Chapter 3.1.3.3 of this EA), the following discussion is limited to offshore cultural resources.

A description of cultural resources (prehistoric and historic) in the Atlantic Region can be found in Chapter 4.2.19 of the Programmatic EIS. Offshore cultural resources include numerous shipwrecks dating from as early as the 16th century. The potential for finding shipwrecks increases in areas such as historic shipping routes, approaches to sea ports, reefs, straits, and shoals, such as the proposed lease blocks. Offshore resources also include submerged prehistoric archaeological sites. The proposed lease area is located within an area of the OCS that would have been above sea level and available to aboriginal human populations during the last ice age. Therefore, the MMS has identified the proposed lease blocks as having a potential for containing historic and prehistoric archaeological resources.

4.1.3.1.2 Impact Analysis of the Proposed Action

Chapter 5.2.19 of the Programmatic EIS discusses impacts that could occur from site assessment surveys, and construction, operation, and decommissioning of offshore structures.

Routine Activities

It is anticipated that during installation, a radius of about 1,500 feet around each installation site may be impacted by anchoring of support vessels. The foundation structure and scour control system, if installed, would occupy a very small portion of each proposed lease area (less than two acres). With no mitigation, impacts could occur in these areas from any bottom disturbing activities: anchors, structure foundation, scour protection system, and bottom mounted/anchored ocean monitoring device. Direct impacts are the result of direct destruction or removal of cultural resources from their primary context. Should contact between the proposed activities and a historic or prehistoric site occur, there would be damage to or loss of significant and/or unique archaeological information.

Non-Routine Events

Though unlikely, diesel spills could occur due to vessel collisions or during generator refueling. If a diesel spill were to occur, it would be expected to dissipate very rapidly and not reach the seafloor, therefore it is unlikely that offshore cultural resources could be impacted by a non-routine event.

Proposed Mitigation Measures

After the lease is issued and initial survey activities, including an archaeology survey, are conducted, the lessee may not commence construction activities until a project plan is submitted to and reviewed by MMS. According to the lease, the lessee's project plan must contain a description of environmental protection features or measures that lessee would use. For offshore cultural resources, the MMS's primary mitigation strategy is avoidance. The exact location of meteorological towers would be adjusted to avoid adverse effects to offshore cultural resources, if present.

Because the proposed lease areas are in an area that the MMS has identified as having a potential for containing historic or prehistoric archaeological resources, the MMS would require archaeological surveys in order to comply with the requirements of Section 106 of the National Historic Preservation Act of 1966. The proposed Archaeological Resources Stipulation (see Appendix A.9) would require a survey lane spacing of no more than 30 meters (100 feet). It is assumed that the 30-meter line spacing would be highly effective survey methodology, allowing detection and avoidance of historic shipwrecks and identification of areas having potential for prehistoric archaeological sites within the survey area. The MMS would also include a “chance finds” clause in the lease stipulation which requires the lessee to halt activities and to immediately notify the MMS if an unanticipated archaeological resource is located during lease activities. Since the survey and clearance process would provide a significant reduction in the potential for a damaging interaction between an impact-producing factor and an offshore cultural site, there is a very small possibility of the proposed activity impacting an offshore cultural resource.

Conclusion

Should contact between the proposed bottom-disturbing activities and an offshore cultural site occur, there would likely be damage to or loss of significant and/or unique archaeological information. However the proposed Archaeological Resources Stipulation would reduce or eliminate the risk of those impacts from occurring. Therefore, no impacts to offshore cultural resources are expected.

4.1.3.2 Recreational Resources

4.1.3.2.1 Description of the Affected Environment

The coastal beaches, barrier islands, estuarine bays and sounds, river deltas, and tidal marshes are extensively and intensively used for recreational activity by residents of the local areas and tourists. Publicly owned and administered areas (such as national seashores, parks, beaches, and wildlife lands), as well as specially designated preservation areas (such as historic and natural sites and landmarks, wilderness areas, wildlife sanctuaries, and scenic rivers) also attract residents and visitors. Commercial and private recreational facilities and establishments (such as resorts and marinas) also serve as primary interest areas and support services for people who seek enjoyment from the recreational resources in these States.

Beaches are a major recreational resource that attracts tourists and residents to the coastal counties for fishing, swimming, shelling, beachcombing, camping, picnicking, bird watching, and other activities. The scenic and aesthetic values of beaches play an important role in attracting visitors. Recreation and tourism provide employment and wages in the coastal counties.

Delaware

Sussex County is the coastal county of Delaware and has substantial recreation, particularly in connection with marine fishing and beach-related activities. The shorefronts along Sussex County offer a diversity of natural and developed landscapes and seascapes.

Ocean related recreation and tourism contributed 6,102 jobs and \$96.8 million in wages for Sussex County in 2004 (National Ocean Economics Program, 2008). This source defines tourism related employment and wages as those from the following travel-related industries: amusement and recreation services, boat dealers, eating and drinking places, hotels and lodging places, marinas, recreational vehicle parks and campsites, scenic water tours, sporting goods retailers, zoos and aquaria.

The 1999-2000 National Survey on Recreation and the Environment (NSRE) is the first national survey to include a broad assessment of the Nation’s participation in marine recreation (USDOC, NOAA, 2005). The number one activity/setting for marine recreation was visiting beaches. Another source indicates that more than 5 million people visit the Delaware Atlantic coastal area each year and spend millions of dollars on their visits (DNREC, Undated).

Delaware has 26 miles of Atlantic Ocean coastline in Sussex county (not counting coastline on Delaware Bay) (Dorfman and Rosselot, 2008). The USEPA reports 20 beaches in the coastal county of Sussex (USEPA, 2004). There are 12 miles of the coastline in state parks (DNREC, Undated). See Figure 1-1 for a map of Sussex County. Table 4-12 presents number of participants and their expenditures in hunting, salt water fishing, and wildlife watching (USDOI, USFWS and USDOC, Bureau of the Census, 2006). The MMS assumes some portion of hunting and wildlife watching takes place in or near the coastal zone of Sussex County. The MMS assumes all of salt water fishing in Table 4-12 takes place offshore of Sussex County.

New Jersey

The coastal counties of New Jersey have substantial recreation, particularly in connection with marine fishing and beach-related activities. The shorefronts along these counties in New Jersey offer a diversity of natural and developed landscapes and seascapes.

Table 4-14 presents employment in tourism-related industries in 2004 (National Ocean Economics Program, 2008). This source defines tourism related employment and wages as those from the following travel-related industries: amusement and recreation services, boat dealers, eating and drinking places, hotels and lodging places, marinas, recreational vehicle parks and campsites, scenic water tours, sporting goods retailers, zoos and aquaria.

According to the NSRE, New Jersey ranked 4th with 6.2 million participants in marine recreation (USDOC, NOAA, 2005). The number one activity/setting for marine recreation was visiting beaches.

New Jersey has 127 miles of public coastal beaches (Dorfman and Rosselot, 2008). The USEPA reports 686 beaches in 6 coastal counties in New Jersey, which is summarized in Table 4-13 (USEPA, 2004). See Figure 1-1 for a map of the coastal counties. Table 4-12 presents number of participants and their expenditures in hunting, salt water fishing, and wildlife watching). The MMS assumes some portion of hunting and wildlife watching takes place in or near the coastal zone of the coastal counties in Table 4-12. The MMS assumes all of salt water fishing quantified in Table 4-12 takes place off the coastal counties.

Table 4-12. 2006 Hunting, Fishing and Wildlife Watching in Delaware and New Jersey¹

Activity	Delaware	New Jersey
Hunters (resident and non-resident)	42,000	89,000
Hunting Total expenditure (\$ million)	41	146
Total Anglers Fishing Salt Water (resident and non-resident)	117,000	496,000
Fishing Total Expenditure (\$ million)	97	752
Wildlife Watching Total Participants (both residents and non-residents)	285,000	1,713,000
Wildlife Watching Total Expenditure (\$ million)	110	265
Total Hunters, Anglers & Wildlife Watching Participants ²	249,000	1,298,000
Total Expenditures for Hunting, Fishing & Wildlife Watching (\$ million) ³	248	1,163

Source: USDOJ, USFWS and USDOC, Bureau of the Census, 2006.

Notes:

¹ U.S. Residents 16 years and older. Detailed figures may not add to the total because of multiple responses and some estimates are based on small sample size.

² The source document does not intend for the number of hunters, anglers and wildlife watching participants to be summed because of different definitions in collecting source data. They are summed here to provide an indication of the scale of participation of these activities.

³ The source document does not intend for the total expenditures of hunting, fishing and wildlife watching to be summed because of different definitions in collecting source data. They are summed here to provide an indication of the scale of expenditure of these activities.

Table 4-13. Number of Beaches in New Jersey and Delaware by County

Coastal Counties	Number
Middlesex	345
Monmouth	61
Ocean	84
Atlantic	48
Cape May	128
Sussex	20
Total	686

Source: USEPA, 2004.

Table 4-14. New Jersey Ocean Related Tourism and Recreation Economy by County, 2004

New Jersey Counties	Employment	Wages
Atlantic	7,304	\$126,533,089
Cape May	7,451	\$140,660,261
Middlesex	1,510	\$25,334,877
Monmouth	7,226	\$120,926,902
Ocean	9,530	\$148,370,859
Total	33,021	\$561,825,988

Source: National Ocean Economic Program, 2008.

4.1.3.2.2 Impact Analysis of the Proposed Action

Routine Activities

Impacts from to coastal recreational resources could occur from onshore staging activities and coastal vessel traffic.

Onshore Activity

Existing ports or industrial areas are expected to be used. Expansion of these existing facilities is not anticipated in support of construction, operation or decommissioning activities.

Coastal Vessel Traffic

It is assumed vessel traffic associated with the proposed action would use established nearshore traffic lanes. Chapter 5.2.22 of the Programmatic EIS concluded as there have been no negative impacts on tourism and recreation reported from military, commercial, and recreational water and air vessels that currently traverse coastal areas intermittently, it is unlikely that there would be any detrimental impact on tourism and recreation from vessels supporting the proposed site characterization activities.

Non-Routine Events

The potential impacts of non-routine events on water quality are discussed in Chapter 4.1.1.2 of this EA. During all phases of the proposed action, multiple sources of diesel fuel would be present including vessels, generators, and pile driving hammers. Spills could occur during refueling or as the result of a collision. If a diesel spill were to occur, it would be expected to dissipate very rapidly. Since diesel is light it would evaporate and biodegrade within a few days. From 2000 to 2004, the average tow and tugboat spill size was 30 to 150 gallons (USCG, 2003). Since the proposed meteorological towers would be located 8-17 miles offshore, it is unlikely a diesel spill would occur and reach the shore.

Litter on recreational beaches adversely affects the ambience of the beach environment, detracts from the enjoyment of beach activities, and increase administrative costs to maintain beaches. Due to the limited nature of the proposed activities and their distance from shore, it is unlikely recreational beaches in Delaware and New Jersey would be impacted by waterborne trash as a result of the proposed action. Any beached litter and debris as a result of the proposed action is unlikely to be perceptible to beach users or administrators.

Proposed Mitigation Measures

The proposed Marine Trash and Debris Awareness and Elimination Stipulation (see Appendix A.6) would reduce or eliminate the risk of intentional and/or accidental introduction of debris into the marine environment.

Conclusion

Due to the distance of the proposed lease areas from shore and that no new coastal infrastructure is proposed, no impacts to coastal recreational resources are expected. The proposed mitigation measure would further reduce or eliminate the risk of impacts from the accidental release of trash and debris on recreational beach usage. Potential impacts to recreational fishing are discussed in Chapter 4.1.3.6 of this EA.

4.1.3.3 Demographics

4.1.3.3.1 Description of the Affected Environment

Population and employment are the main dimensions of demographics examined by MMS. Table 4-15 presents population and employment for the relevant coastal county in Delaware and New Jersey (see Figure 1-1).

Table 4-15. Population, Employment and Personal Income by Coastal County, 2000 and 2006

New Jersey	Population ¹		Employment ²		Personal Income ² (\$ millions)	
	2000	2006	2000	2006	2000	2006
Counties	2000	2006	2000	2006	2000	2006
Atlantic	252,552	271,620	153,199	158,389	7,975	9,577
Cape May	102,326	97,724	43,051	46,764	3,239	4,009
Middlesex	750,162	786,971	432,859	428,834	27,477	34,485
Monmouth	615,301	635,285	263,149	279,433	26,318	32,998
Ocean	510,916	562,335	144,259	162,412	15,582	20,235
Total	2,231,257	2,353,935	1,036,517	1,075,832	80,591	101,304
Delaware	Population ¹		Employment ²		Personal Income ² (\$ millions)	
County	2000	2006	2000	2006	2000	2006
Sussex	156,638	184,291	66,810	77,365	3,816	5,651

¹ Source: USDOC, Bureau of the Census, 2008a.

² Source: USDOC, Bureau of Economic Analysis, 2008.

4.1.3.3.2 Impact Analysis of the Proposed Action

The proposed action would require various support services from within the coastal counties listed above. Due to the short duration of survey, construction and decommissioning activities, any benefit would be short term. Also these activities are not expected to employ many workers relative to the existing employment numbers stated above. Therefore, the proposed action is expected to have minor positive impacts on the population and employment of Delaware and New Jersey.

4.1.3.4 Environmental Justice

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (59 FR 7629), issued by President Clinton on February 11, 1994, requires Federal agencies to incorporate environmental justice as part of their missions. Specifically, it directs them to address, as appropriate, any disproportionately high and adverse human health or environmental effects of their actions, programs, or policies on minority and low-income populations. See the Final Alternative Energy Programmatic EIS for a complete description of method of analysis (pages 4-114 and 4-115, USDOJ, MMS, 2007).

4.1.3.4.1 Description of the Affected Environment

In 2006 in Sussex County, Delaware, 8.5 percent of all families lived below poverty level (USDOC, Bureau of the Census, 2008b) and minorities made up 19.7 of the population (Bureau of the Census, 2008b). The percentage of families living below poverty level in Sussex County is greater than the State average. See Figure 1-1 for a map of Sussex County.

Table 4-16 presents the percentage of all families living below the poverty level and the percentage of minorities in the relevant coastal counties in New Jersey (see Figure 1-1). The percentage of minority

families in Atlantic and Middlesex counties is above the State average. Atlantic and Ocean Counties have a higher percentage of families living below poverty level than the State average.

Table 4-16. Percent of All Families below Poverty Level and Percent Minority in 2006

New Jersey Counties	Poverty Level ¹	Minority ¹
Atlantic	7.0	34.4
Cape May	5.4	9.3
Middlesex	5.1	39.2
Monmouth	4.0	17.6
Ocean	7.0	9.4

¹ Source: USDOC, Bureau of the Census, 2008b

4.1.3.4.2 Impact Analysis of the Proposed Action

The proposed leases would be located 8-17 miles from the nearest shoreline. Therefore, the data gathering activities occurring within the proposed lease areas would have no impacts on environmental or health effects on minority or low-income people. Only the use of existing coastal facilities has the potential to impact minority or low-income people. However, several existing fabrication sites, staging areas, and ports in Delaware and New Jersey would support survey, construction, operation and decommissioning activities as discussed in Chapter 3.1.3.3 of this EA. No expansion of these existing areas is anticipated to support the proposed action. Due to the distance from shore and the use of existing facilities, the proposed action is not expected to have disproportionately high or adverse environmental or health effects on minority or low-income people.

4.1.3.5 Land Use and Coastal Infrastructure

Chapter 4.2.20 of the Programmatic EIS discusses land use and existing infrastructure along the Atlantic coast. As discussed in Chapter 3.1.3.3 of this EA, existing ports or industrial areas are expected to be used, and expansion of these existing facilities is not anticipated to support the proposed action. No significant impact on land use or coastal infrastructure is expected, and therefore, land use and coastal infrastructure is not discussed further.

4.1.3.6 Commercial and Recreational Fishing Activities

4.1.3.6.1 Description of the Affected Environment

The area offshore of Delaware and New Jersey is used actively for both commercial and recreational fishing. The following section discusses these activities. Commercial and recreational fish species in the Atlantic region are discussed in Chapters 4.2.23.1 and 4.2.23.2 of the Programmatic EIS, respectively. Chapter 4.1.2.7.1 of this EA discusses the commercial and recreational fish species present off of Delaware and New Jersey.

Recreational Fishing

Over 250,000 recreational boats are registered in New Jersey and Delaware making the area one of the busiest recreational boating regions in the country (Marriott and Frantz, 2008). In 2007, about three-quarters of a million recreational fishing trips were made to the Federal waters off of Delaware and New Jersey (NOAA Fisheries, Office of Science and Technology, 2009b). Of those about 95 percent took place from May to October and about 57 percent in July and August.

Commercial Fishing

The estimated size and value of the commercial fish landings in New Jersey in 2007 was over 153 million pounds, valued at over \$152.4 million (USDOC, NOAA Fisheries, Office of Science and Technology, 2008). The estimated value for 2007 for marine commercial fisheries in Delaware was over 5 million pounds valued at about \$7.6 million (USDOC, NOAA Fisheries, Office of Science and Technology, 2009b). Of New Jersey's landings in 2007, approximately 92-93 percent were from Federal waters, compared to 4 percent of Delaware's landings (NOAA Fisheries, Office of Science and Technology, 2009b). A total of 5,043 commercial fishing trips were taken in Delaware during 2000, with most occurring in April (Whitmore, 2001).

Prime Recreational Fishing Areas

New Jersey has identified 2.8 million acres of prime recreational fishing areas offshore Delaware and New Jersey. The following is block-specific information derived from NJDEP's sport ocean fishing geographic information system (GIS) data (NJDEP, Division of Fish and Wildlife, 2003) unless otherwise noted.

Block 6325: Of the seven proposed lease areas, Block 6325 is located the farthest south, off of Delaware Bay. Almost all of Block 6325 has been identified by NJDEP as prime fishing area, specifically described as mussel beds where sea bass/tautog was present. This block is located adjacent to Delaware's artificial reef site, Red Bird. This reef site supports "excellent fishing for black sea bass and summer flounder," in addition to sea bass, tautog, flounder and scup (DNREC, 2008).

Block 6931: Almost half of Block 6931 has been identified by NJDEP as prime fishing area, specifically described as stone beds. The following were present: summer flounder, sea bass/tautog, bluefish, bonito/albacore, scup, and red hake.

Block 7131: Almost half of Block 7131 has been identified by NJDEP as prime fishing area, specifically described as Sylvester's and Sea Isle Ridge where bluefish and bonito/albacore were present.

Remaining Blocks: No prime fishing areas were identified within Blocks 6738 and 7033. Very small portions of Blocks 6451 and 6936 were identified by NJDEP as prime fishing areas.

Fishing Ports

Commercial fishing occurs through out the year (USDOC, NOAA Fisheries, Office of Science and Technology, 2009d). Four major commercial fishery landings are located within 50 miles of the proposed lease areas. Ranked by 2007 dollar value, they are CapeMay-Wildwood (#8), Atlantic City (#27), Long Beach-Barnegat (#35), and Point Pleasant, New Jersey (#36) (NOAA Fisheries, Office of Science and Technology, 2009e). In addition to the ports there a number of smaller ports along the Delaware, Barnegat and Raritan Bays. Each supports a number of inshore and offshore fisheries, except for the Atlantic City fleet which is exclusively dedicated to the surf clam/ocean quahog fishery (Garden State Seafood Association, 2009).

4.1.3.6.2 Impact Analysis of the Proposed Action

The following section discusses the potential impacts from the proposed action on commercial and recreational fishing activities off of Delaware and New Jersey. Chapter 5.2.23.2 of the Programmatic EIS discusses impacts of typical site characterization activities on commercial and recreational species, while Chapter 4.1.2.7.2 of this EA discusses impacts specific to the proposed action on commercial and recreational fish species.

Routine Activities

Impact producing factors from routine activities include space-use conflicts, coastal vessel traffic, and disturbances to fish resources.

Space-Use Conflicts

Site assessment surveys, and construction and decommissioning of meteorological towers have the potential to result in space-use conflicts with commercial and recreational fishing activities. During proposed action activities fishing vessels could be excluded from normal fishing grounds for short durations to avoid the potential for gear loss or for perceived disturbances to fishery resources. It is anticipated that during installation and decommissioning of a meteorological tower, a radius of about 1,500 feet around the site would be needed for the movement and anchoring of support vessels. Site assessment surveys, and construction and decommissioning activities would occur during spring and summer, when the majority of recreational fishing occurs.

The area of ocean bottom affected by a meteorological tower would range from about a couple hundred square feet if supported by a monopole to a couple thousand square feet if supported by a jacket foundation. The proposed meteorological towers would be present 2-5 years, and would restrict mostly mobile commercial fishing gear (e.g., dredges and trawls). New Jersey has identified 2.8 million acres of prime fishing areas of which some of the proposed meteorological towers may occupy a very small portion. It is not anticipated that recreational fishing activities and recreational boating would be precluded from the area surrounding meteorological towers.

As required by the lease, the proposed meteorological towers would be removed to at least 5 meters (15 feet) below the mudline to ensure that nothing would be exposed that could interfere with future lessees and other activities in the area. Once the meteorological towers are removed, the proposed sites would pose no obstacle to commercial or recreational fishing.

Coastal Vessel Traffic

There are numerous locations along the Delaware and New Jersey's coastlines for recreational fishing, including areas along navigation channels. Vessel traffic associated with the proposed action would utilize some of these waterways to reach existing port facilities. These vessels can generate wakes that are a nuisance to recreational fishermen; if the wakes are large enough, they may even pose a safety issue for those in small boats. It is standard practice for vessels to slow to idle speed when passing recreational fishing vessels. If this is done, impacts to recreational fishermen are negligible. During the life of the seven proposed leases, less than 1,000 rounds trips are expected. This number is small compared to millions of commercial and recreational vessel trips projected to occur during the same period.

Disturbances to Fish Resources

Chapter 4.1.2.7 of this EA, concluded due to the small number of vessel trips and limited construction required, noise associated with siting, construction, operation and decommissioning activities would have no detectable or persistent effects on fish resources. Localized turbidity is expected to be minimal due to the nature of the substrate, the limited area of activity and the use of technologies that minimize sediment disturbance. Fish attraction to the meteorological towers is not expected to be marked since each would be a single structure, with less complexity than true artificial reefs. The positive and negative effects to EFH of the small amount of extra hard surface habitat would be negligible and be lost at decommissioning.

Non-Routine Events

The potential impacts of non-routine events on water quality are discussed in Chapter 4.1.1.2 of this EA. During all phases of the proposed action, multiple sources of diesel fuel would be present including vessels, generators, and pile driving hammers. Though unlikely, spills could occur during refueling or as

the result of a collision. If a diesel spill were to occur, it would be expected to dissipate very rapidly. Since diesel is light it would evaporate and biodegrade within a few days. From 2000 to 2004, the average tow and tugboat spill size was 30 to 150 gallons (USCG, 2003). The likelihood of such a spill is relatively low.

Proposed Mitigation Measures

The proposed Notification of Fishermen Stipulation (see Appendix A.9) would reduce potential economic impacts on commercial fishermen by requiring that fishermen be notified of construction and decommissioning activities via the USCG Local Notice to Mariners and daily broadcasts on Marine Channel 16.

The proposed Site Clearance Stipulation (see Appendix A.10) would ensure that the proposed structures, once decommissioned, do not interfere with future lessees and other activities in the area, bottom debris introduced as a result of the proposed operations must be removed. This stipulation would require verification and evidence of site clearance.

In addition, the following mitigation measures have been proposed to reduce or eliminate potential impacts on fish and EFH, which would therefore benefit commercial and recreational fishing as discussed in Chapter 4.1.1.2.2 of this EA:

- The proposed Reduction or Elimination of the Potential for Adverse Impacts from Pile Driving Stipulation (see Appendix A.4) would reduce or eliminate potential impacts of noise on fish; and
- The proposed Marine Trash and Debris Awareness and Elimination Stipulation (see Appendix A.6) would reduce or eliminate potential impacts on water quality.

Conclusion

The small increase in vessel activity that would occur and the presence of the meteorological towers would not measurably affect commercial or recreational fishing activities, catchability of fish and shellfish, or navigation. Any impacts would be of short duration, a limited area, and temporary. The proposed mitigation measures would further reduce or eliminate the impacts on fisheries due to noise from pile driving and intentional and/or accidental introduction of debris into the marine environment.

4.2 Alternative A—Reduced Number of Leases

Under the Alternative A, fewer leases would be issued offshore New Jersey for the installation of meteorological or marine data collection facilities to assess renewable energy resources. Leases would be issued under the interim policy authorizing installation of a data collection facility and associated activities in four of the seven blocks proposed: 6325, 6738, 6931, and 6936. Blocks 7131, 7033, and 6451 would not be issued at this time.

Impact Analysis of Alternative A

The types of activities expected to occur under Alternative A would be similar to those expected under the proposed action. However, there would be substantially less activity related to the construction, operation and decommissioning of just four meteorological towers. Consequently, the already negligible to minor potential impacts related to the proposed action would be even less under Alternative A. Compared to the proposed action, the risk of most potential impacts described in Chapter 4.1 of this EA would be substantially reduced.

Site Assessment Surveys and Construction

Under Alternative A, only four of the seven proposed meteorological towers would be constructed, and site assessment surveys would only be conducted for those four sites. Therefore, the potential risk of noise-related impacts on marine mammals and sea turtles described under the proposed action would be

substantially less. The following proposed lease stipulations would reduce even further the potential impacts of Alternative A on marine mammals and sea turtles from vessel traffic, seismic surveys, construction activities including pile driving, and accidental introduction of trash and debris:

- The proposed Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program (see Appendix A.2) contains mitigation, monitoring and reporting requirements that would be implemented during the conduct of all high-resolution seismic surveying work including the establishment of visual and exclusion zones, and ramp up and down procedures;
- The proposed Reduction or Elimination of the Potential for Adverse Impacts Activities on Protected Species from Construction Stipulation (see Appendix A.3) would reduce or eliminate the potential for adverse impacts to protected species from construction activities by requiring pre-construction briefings between crews and marine mammal and sea turtles visual observers, and establishing exclusion zones during pile driving; and,
- The proposed Reduction or Elimination of the Potential for Adverse Impacts from Pile Driving Stipulation (see Appendix A.4) would reduce or eliminate the potential for adverse impacts from pile driving by requiring the use of vibratory hammers rather than impact hammers to the extent possible, and if impact hammers are used, would require monitoring and implementation of “soft starts.”

Vessel Traffic

About 400 fewer vessel trips would occur as a result of Alternative A compared to the number of trips projected to occur as the result of the proposed action. Therefore, the risk of vessel emissions and discharges affecting air and water quality, and vessel collisions with marine mammals and sea turtles would be reduced. To reduce or eliminate the potential for vessel collisions with ESA-listed marine mammals and sea turtles from the approximately 600 vessel trips still projected to occur under Alternative A, the proposed Vessel Strike Avoidance Stipulation (see Appendix A.5) would require that specific measures including training, speed restrictions, avoidance zones, and reporting requirements.

Bottom Disturbance

Any bottom disturbing activities such as surveying, anchoring, and structure placement could impact benthic communities and offshore archaeological resources, if present. Because meteorological towers would not be installed in Blocks 7131, 7033, and 6738, there would be no risk of damaging bottom habitat or an offshore cultural resource in the three blocks deferred under Alternative A. For benthic communities and offshore cultural resources, the MMS's primary mitigation strategy has and will continue to be avoidance. The exact location of the remaining four meteorological towers would be adjusted to avoid adverse effects to benthic communities or offshore cultural resources, if present. The proposed Biological Surveys and Reports Stipulation (see Appendix A.1) and Archaeological Resources Stipulation (see Appendix A.9) would further reduce or eliminate the risk of those impacts from occurring in the remaining four blocks.

Presence of Meteorological Towers

Though collisions are unlikely, fewer meteorological towers would reduce the risk of birds and bats colliding with meteorological towers. The proposed Reduction or Elimination of the Potential for Adverse Impacts to Birds and Bats Stipulation (see Appendix A.7) would reduce the potential impacts the presence of the four remaining meteorological towers would pose on birds by requiring the use of anti-perching devices, imposing lighting restrictions, and prohibiting the use of guy wires.

Space-Use Conflicts

Because meteorological towers would not be installed in Blocks 7131, 7033, and 6738, there would be no space-use conflicts between site assessment surveys, and construction and decommissioning

activities and commercial and recreational fishing in the three blocks deferred under Alternative A. Site assessment surveys, construction and decommissioning activities for the four remaining meteorological towers still have the potential to result in space-use conflicts with commercial and recreational fishing activities. Fishing vessels could be excluded from normal fishing grounds for short durations to avoid the potential for gear loss or for perceived disturbances to fishery resources during survey, construction and decommissioning of the four remaining meteorological. The proposed Notification of Fishermen Stipulation (see Appendix A.9) would reduce potential economic impacts on commercial fishermen by requiring that fishermen be notified of construction and decommissioning activities via the USCG Local Notice to Mariners and daily broadcasts on Marine Channel 16. Once the meteorological towers are removed, the proposed sites would pose no obstacle to commercial or recreational fishing. The proposed Site Clearance Stipulation (see Appendix A.10) would ensure that the proposed structures, once decommissioned, do not interfere with future lessees and other activities in the area, bottom debris introduced as a result of the proposed operations must be removed. This stipulation would require verification and evidence of site clearance.

Data Collection Opportunities

Fewer meteorological towers would reduce the opportunities to collect critical meteorological, oceanographic, and biological data that are necessary for ultimate deployment of commercial-scale renewable energy production offshore of New Jersey on the OCS. The data necessary to successfully determine the feasibility of these three lease areas for commercial wind energy development from a dedicated data collection facility could not occur and baseline environmental information that informs subsequent approvals could not be collected. Consequently, Alternative A would result in a reduction of the number of sites to collect such data which would limit the number of possible sites to develop commercial-scale renewable energy production on the OCS offshore New Jersey on the OCS with minimal benefit to the environment.

4.3 Alternative B—No Action

Under the No Action Alternative, no leases would be issued, under the interim policy, authorizing installation of a data collection facility and associated activities in blocks Salisbury NJ 18-05 Block 6325, Hudson Canyon NJ 18-03 Block 6451, and Wilmington NJ 18-02 Blocks 6738, 6931, 6936, 7033, and 7131. Any potential environmental and socioeconomic impacts, described in Chapter 4.1 of this EA, from these activities would not occur or would be postponed. Opportunities for the collection of meteorological, oceanographic and biological data in these offshore areas would also not occur or would be postponed.

On December 17, 2008, the New Jersey Board of Public Utilities approved a \$12 million rebate program for offshore meteorological towers (Leach, 2008). Three companies, Bluewater, FERN and Garden State Offshore Energy (a joint venture of PSEG Renewable Generation and Deepwater), were approved to receive rebates of \$4 million each under the condition the towers are operational by the end of 2009. If the proposed leases discussed in this EA are not issued by MMS, then New Jersey's rebate program would not be realized for meteorological towers on the Federal OCS.

Under the no action alternative, the data necessary to successfully determine the feasibility of the lease areas for commercial wind energy development from a dedicated data collection facility could not occur and baseline environmental information that informs subsequent approvals could not be collected. Bluewater, Deepwater and FERN would not be allowed to collect data necessary to develop commercial-scale renewable energy production on the OCS offshore Delaware or New Jersey with minimal benefit to the environment. Therefore, the no action alternative does not satisfy the purpose and need for this action.

4.4 Cumulative Environmental and Socioeconomic Impacts

Cumulative impacts are the impacts on the environment that result from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what agency, industry, or person undertakes the other actions. Chapter 7.6.2 of the Programmatic EIS discusses generic impacts of cumulative activities to individual environmental and socioeconomic resources.

Chapter 4.1 of this EA concluded that the proposed action would have a negligible to minor impact on environmental and socioeconomic resources. In addition, the seven proposed lease areas are located over an 80-mile area with a minimum separation distance of four miles. Offshore activities would result in localized impacts, and impacts of individual meteorological towers and their associated activities would not overlap. Therefore, there would be no additive effect on offshore environmental resources of approving multiple locations.

Potential impact producing factors of the proposed action include discharges; bottom disturbance from surveying, anchoring, and structure placement; disturbance and collision risk due to vessel traffic; and disturbance, space-use conflicts, and collision risk due to the presence of meteorological towers. The major cumulative activities that would likely occur offshore Delaware and New Jersey during the life of the proposed action (up to five years) are 1) vessel traffic (military, commercial and recreational) (Chapters 3.4.4.1 and 3.4.4.2 of this EA), and 2) other renewable energy projects (Chapter 3.3.3 of this EA). These cumulative activities would have similar impact producing factors, but impacts would occur much more frequently and impact a larger area than the proposed action. For example, less than 1,000 vessel trips would result from the proposed action compared to millions of other vessel trips that would occur during the same period (Chapter 3.3.2 of this EA). These millions of vessel trips would contribute to discharges affecting water quality, bottom disturbances from anchoring potentially impacting offshore biologically sensitive areas and cultural resources, and the risk of collisions with marine mammals. In addition, renewable energy development projects would have significantly larger footprints than the proposed meteorological towers with an increased risk of encountering biologically sensitive areas and cultural resources during construction. It is not anticipated that commercial and recreational fishing activities and recreational boating would be precluded from the area surrounding proposed meteorological towers, or that these towers would interfere with military activities and vessel traffic, opposed to renewable energy development projects which may restrict fishing in large areas and interfere with military activities and vessel traffic. Therefore, the incremental contribution of the proposed action to cumulative impacts on the environmental and socioeconomic resources described in Chapter 4.1 of this EA, would be negligible to minor.

5 CONSULTATION AND COORDINATION

The MMS conducted early coordination with appropriate Federal and State agencies and other concerned parties to discuss and coordinate the development of MMS's alternative energy interim policy and this EA. Key agencies included NMFS, USFWS, Department of Defense (DOD), FAA, National Aeronautics and Space Administration (NASA), USACE, USCG, USEPA, Delaware Department of Natural Resources and Environmental Control (DREC), Delaware Public Service Commission (DEPSC), New Jersey Board of Public Utilities (NJBP), and NJDEP. In addition to formal consultations and cooperating agency exchanges, as detailed below, the MMS regularly coordinated with the Federal and State agencies noted on an informal basis through dialogue, teleconferences, and in-person meetings.

5.1 Programmatic Alternative Energy and Alternative Use EIS

This EA tiers from MMS's *Programmatic Environmental Impact Statement for Alternative Energy Development and Production and Alternate Use of Facilities on the Outer Continental Shelf, Final Environmental Impact Statement, October 2007* (Programmatic EIS) (USDOI, MMS, 2007), which evaluates the establishment of a comprehensive, nationwide MMS Alternative Energy Program on the

Federal OCS through rulemaking. Chapter 8 of the Programmatic EIS describes the consultation and coordination activities with Federal, State, and local agencies and other interested parties that occurred during the development of the Programmatic EIS. Public scoping meetings were held at ten locations in May and June 2006, and public hearings were held in nine locations in April and May 2007. Comments received and transcripts of public meetings can be found at <http://www.ocsenergy.anl.gov/>.

5.2 Public Involvement

5.2.1 Public Comments

On November 6, 2007, the MMS announced in the *Federal Register* an interim policy to issue leases that would authorize of the installation of meteorological or marine data collection facilities to assess renewable energy resources (e.g., wind, wave, and ocean current) or to test renewable energy technology to produce or support production of renewable energy in Federal waters. The MMS accepted comments and nominations until January 7, 2008. In response, the MMS received over 40 nominations of areas of interest off the West and East coasts. On April 18, 2008, the MMS identified a subset of 15 proposed lease areas for priority consideration, and again requested comments from interested and affected parties. The MMS accepted competing nominations until May 30, 2008 and comments until June 30, 2008. No competing nominations were received on the proposed leases addressed in this EA. A total of about 65 comments were received during the two comment periods. Issues included coordination among agencies; level of NEPA analysis reflecting the limited nature and duration of the proposed activities; and confidentiality, accessibility, and standardization of data collected. No environmental concerns were expressed specifically regarding the construction and operation of meteorological towers offshore Delaware and New Jersey.

5.2.2 Regulator/Stakeholder Workshops

The MMS held informational workshops with regulators and stakeholders in the regions where interim policy leases are under consideration in November 2008. The purpose of these meetings was to provide an overview of MMS's interim policy leasing and environmental review processes, to discuss details of the proposed interim policy projects, and to facilitate collaboration among Federal, State, Tribal, and local governments.

Workshops related to the proposed leases analyzed in this EA were held in Rehoboth Beach, Delaware and Atlantic City, New Jersey on November 5 and 6, 2008, respectively.

Approximately 20 people attended the November 5, 2008 workshop in Rehoboth, Delaware including representatives from the Delaware DNREC, USACE, USCG, USEPA, NASA Wallops Flight Facility, University of Delaware, and the applicant, Bluewater and their consultant Tetra Tech.

Approximately 25 people attended the November 6, 2008 workshop in Atlantic City, New Jersey including representatives from the NJBPU, Monmouth County Planning Commission, and the NJDEP, USACE, USCG, USEPA, NMFS, USFWS, New Jersey Coast Anglers Association, Science Applications International Corporation (SAIC), Public Service Enterprise Group Incorporated (PSEG), Frascella and Piscauro LLC, and the applicants: Bluewater, Deepwater and Deepwater's consultant Ecology and the Environment, and FERN.

Issues discussed included: (1) types of avian data to be collected from the meteorological towers; (2) how MMS will handle and work with the States on historical sites identified in Federal waters; (3) potential impacts from the use of guy wires and lattice-type meteorological towers; (4) coordination with the NJDEP Coastal Zone Management Office on CZMA issues; (5) issues associated with the use of a jack-up barge as a met-tower foundation; (6) the relationship between the MMS environmental analysis and the USACE permitting process; (7) coordination with USACE on Rivers and Harbors Act Section 10 permits; (8) alternatives under NEPA; (9) the need to review site assessment data collected under the lease before issuing permits and finalizing consultations; (10) types of data collection allowed off lease;

(11) coordination with the USCG; and, (12) Coastal Zone Program differences between New Jersey and Delaware.

5.3 Cooperating Agency

Regulations found at 33 CFR 325.8 give the USACE the authority to issue permits for construction work in or affecting navigable waters of the U.S. pursuant to Section 10 of the Rivers and Harbors Act of 1899. This includes the proposed site assessment surveys and construction of meteorological towers addressed in this EA. Therefore, in a letter dated November 20, 2008, the MMS invited the USACE to be a cooperating agency in the preparation of this EA. That invitation was accepted by the USACE's Philadelphia District in a letter to MMS dated December 9, 2008. The USACE is also a joint agency on the ESA and EFH consultations described below.

5.4 Endangered Species Act Consultations

As required by Section 7 of the ESA, the MMS consulted with NMFS and USFWS on potential impacts from the proposed action on endangered/threatened species and designated critical habitat under their jurisdiction. On January 9, 2009, the MMS requested informal consultations with NMFS and USFWS. A BA, prepared by MMS for the consultations, concluded the proposed action was likely to affect but not adversely affect ESA-listed sea turtles, marine mammals, bats, birds, and fish (USDOI, MMS, 2008b).

On February 26, 2009, the USFWS concurred with MMS's BA and concluded in their informal consultation that the proposed meteorological towers are not likely to adversely affect the three listed species under USFWS's jurisdiction: the roseate tern, piping plover, and red knot. The USFWS noted that biological data needed to be collected which would support future environmental analyses and further recommended that visibility sensors be installed on the towers.

In a letter dated May 14, 2009, NMFS concluded that the proposed action is not likely to adversely affect any listed species under NMFS jurisdiction.

Those companies applying to MMS for leases would be responsible for applying for other applicable permits, such as an incidental harassment authorization under the MMPA. Information regarding the NMFS permitting can be found at <http://www.nmfs.noaa.gov/pr/permits/>.

5.5 Essential Fish Habitat Consultation

As required by the Magnuson Fishery Conservation and Management Act, the MMS consulted with NMFS on possible and potential impacts from the proposed action on EFH. On January 5, 2009, the MMS requested an abbreviated consultation with NMFS. An EFH assessment, prepared by MMS for the consultation, concluded due to the small number of vessel trips and limited construction required, noise associated with siting, construction, operation, and decommissioning activities would have no detectable or persistent effects on fish resources (USDOI, MMS, 2008c). Localized turbidity is expected to be minimal due to the nature of the substrate, the limited area of activity, and the use of technologies that minimize sediment disturbance. Fish attraction to the meteorological towers is not expected to be marked since each will be a single structure, with less complexity than true artificial reefs. The positive and negative effects to EFH of the small amount of extra hard surface habitat would be negligible and be lost at decommissioning.

On February 12, 2009, the NMFS concurred with the conclusions and proposed mitigation measures described in MMS's EFH assessment. While NMFS offered no EFH conservation measures at this time, NMFS encourages the potential lessees to avoid areas "that have been mapped as prime fishing habitat by the State of New Jersey, or have been identified as current or historically harvested surf clam beds by the States of Delaware and New Jersey or by the commercial shellfish industry." The NMFS also requested that they have an opportunity to review the specific project plans as they become available; MMS has

agreed to provide them to NMFS. Unless changes to the action are proposed, or new information becomes available, no further EFH consultation is required.

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APPENDIX A PROPOSED MITIGATION MEASURES

The following mitigation measures are proposed to reduce or eliminate environmental risks. Because the proposed leases would authorize construction, operation and decommissioning of meteorological and oceanographic data collection facilities on the leased areas, the MMS can add mitigation measures for those activities in the form of lease stipulations to the lease terms and are therefore enforceable as part of the lease. Application of lease stipulations will be considered by the ASLM or his designee. Minor modifications to the stipulations may be made during subsequent steps in the leasing process if comments indicate changes are necessary or if conditions warrant. Operational compliance of the requirements of the lease and adopted stipulations would be enforced through the MMS on-site inspection program.

Seismic surveys necessary to finalize engineering and placement of the proposed meteorological towers would be authorized by the USACE under a Nationwide Permit 6, Survey Activities. Therefore, any adopted mitigation measures related to seismic surveys, according to the USACE, would be included as conditions in permits issued by the USACE.

A.1 Biological Surveys and Reports Stipulation

If seafloor characteristics are identified that suggest the presence of biologically sensitive habitats near proposed lease activities, a biological survey of the seabed must be conducted and a biological survey report prepared and submitted before conducting lease activities that would disturb the seafloor. Information from all available sources relevant to the region of influence should be analyzed to detect such seafloor characteristics. These sources include the lessee's geophysical hazard surveys, scientific literature, and all other sources available. Areas of suspected or observed biologically sensitive habitats must be targeted for site-specific surveys. These include areas where information suggests the presence of exposed hard bottoms of high, moderate, or low relief; hard bottoms covered by thin, ephemeral sand layers; rocky outcrops; surf clam habitat; scallop habitat; or seagrass patches.

A biological survey is designed to determine the presence and extent of biologically sensitive habitats near proposed lease activities. Following are guidelines for conducting surveys for biologically sensitive habitats and for preparing the survey report.

Biological Surveys

- A. Lessee shall survey targeted sites identified by information suggesting the presence of biologically sensitive habitats near lease activities. Targeted sites must be surveyed if they are within 100 meters of any proposed site of seafloor disturbance. Targeted sites must also be surveyed if they are within 1,000 meters of proposed sites of excavation or other activities that generate similar turbidity plumes. Biological surveys of targeted sites must extend beyond the limits of the biologically sensitive habitat far enough to ensure the habitat is fully delineated. Delineation of biologically sensitive habitats is not required beyond 1,000 meters from a turbidity site or 100 meters from other seafloor disturbances. Survey coverage of targeted sites must characterize substrate type and the benthic community across the entire area. Small sites should be given near 100 percent survey coverage. Larger sites may separate transect lines as much as 20 meters between parallel transects. Professional judgment should be used to ensure thorough characterization of the biologically sensitive habitat.
- B. Lessee must extend surveys to the appropriate distance beyond each proposed seafloor disturbance. Surveys must extend outside the lease boundaries if this is necessary to obtain the appropriate survey distances.
- C. Lessee must consider all proposed seafloor disturbances of all lease activities for the life of the lease to a minimum distance of 100 meters from the disturbance. This includes both site-specific disturbances and areas of proposed widespread seafloor disturbance. This refers to areas of proposed seafloor disturbance that are not site-specific but cover a larger area, such as an anchoring

area. Areas of proposed sites of excavation or other activities that generate similar turbidity plumes must be considered to a distance of 1,000 meters.

- D. Biological surveys consist of underwater color videography and still photography. The lessee shall operate a video camera in conjunction with a still camera having a resolution of at least eight megapixels. Integrate the video/still imagery with the simultaneous and continuous tracking of Differential GPS positioning, bearing, time, and water depth to be displayed on the video. The geographic positions of imagery should be accurate with less than one meter of error per 100 meters of water depth. Add the geographic coordinates of each still photograph to the properties dialog box of each electronic file. Ensure that the biological survey is conducted under the proper conditions (e.g., tow speed, water clarity, height above the bottom) to enhance the lessee's ability to determine the presence or absence and characterization of any biologically sensitive habitats. Lessee shall incorporate a scale into both the video and still imagery, such as using laser lights with a known distance of separation. The lessee must have the ability to actuate the shutter on the still camera as needed during the survey to document benthic communities. Lessee shall take still photographs of selected areas at a frequency to determine the extent, type, and percent biotic cover of the biologically sensitive habitats the lessee encounters during surveys. Lessee shall analyze a minimum number of photographs necessary to estimate the percent cover of benthic organisms for each biologically sensitive habitat. For communities of scattered organisms, such as gorgonians or sea pens, the lessee may provide estimates of density, i.e., number of organisms per meter square instead of percent cover. These numbers must be standardized to one meter square. Lessee shall identify visually dominant epibiota during each survey. When surveying areas devoid of biologically sensitive habitats, provide the MMS with continuous video and with still photographs of the barren seafloor at least every 200 meters (656 feet).
- E. Please be advised that if the lessee materially revises the proposed location(s) of activities after the lessee performs a biological survey, the lessee may have to conduct a new survey to provide coverage of the revised location(s).

Biological Survey Reports

1. Lessee shall include the following information in the lessee's biological survey report:
 - a. Introduction. Describe sources and information gathered before the work to characterize bottom types and benthic communities. Summarize information collected.
 - b. Equipment. Provide a detailed description of the equipment the lessee used, including camera settings, recording media, lighting, platform (ROV, sled, drop camera, etc.) differential GPS (with datum, settings, etc.), compass, gyroscopic compensation, USBL, sonar, and all other pertinent equipment (these components are not necessarily all required; describe what was used);
 - c. Summary of Work. Describe the work performed. Give dates and times of field efforts, weather conditions, sea state, currents, light, visibility, etc. Explain any methods or techniques that need clarification in addition to the requirements of this document to support reproducibility of the work.
 - d. Results. (1) Provide a large format map showing bathymetry, the tracks of video/still camera transects, the indexed locations of still images, the extent and position of biologically sensitive habitats as determined from the biological survey, and the locations of proposed seafloor disturbances (including pilings, excavations, scour protection, anchors, chains, cables, wire ropes, etc). Include a smaller format copy (letter size) of the map in the report pages also. (2) Provide a large format map showing the extent and position of biologically sensitive habitats as determined from the biological survey and the locations of proposed seafloor disturbances. Include a smaller format copy (letter size) of the map in the report pages also. (3) Discuss the substrate types observed throughout the survey area. (4) Describe biologically sensitive habitat assemblages in each area identified. (5) Discuss the interpretation of the geophysical data as it relates to the actual benthic characteristics determined through the biological survey, to include: (a) sediment

- types and thickness; (b) evidence of hard-bottom signature(s); and (c) correlation of geophysical data with biological data.
- e. Conclusions.
 - f. References.
 - g. Appendix. Provide representative photographs of biologically sensitive habitats and substrate types encountered.
2. Lessee shall submit the original collected data, including video and still photographs as accompaniment to the biological survey report. Submit Geographic Information System (GIS) files for separate layers representing bathymetry, the tracks of video/still camera transects, the indexed locations of still images with links to electronic photo files, the extent and position of biologically sensitive habitats as determined from the biological survey, and the locations of proposed seafloor disturbances.
 3. If requested by the MMS, lessee shall deliver a formal presentation to MMS of the biological survey report.

A.2 Implementation of Seismic Survey Mitigation Measures and Protected Species Observer Program

The following mitigation, monitoring and reporting requirements shall be implemented by the lessee during the conduct of all high-resolution seismic surveying work.

1. Establishment of Exclusion Zone: A 500 meter (1,640 feet) radius exclusion zone for listed marine mammals and sea turtles will be established around the seismic survey source vessel in order to reduce the potential for serious injury or mortality of these species.
2. Visual Monitoring of Exclusion Zone: The exclusion zone around the seismic survey source vessel must be monitored for the presence of listed marine mammals or sea turtles before, during and after any seismic survey activity. The exclusion zone will be monitored for 30 minutes prior to the ramp up (if applicable) of the seismic survey sound source. If the exclusion zone is obscured by fog or poor lighting conditions, surveying will not be initiated until the entire exclusion zone is visible for the 30 minute period. If listed marine mammals or sea turtles are observed within the zone during the 30 minute period and before the ramp up begins, surveying will be delayed until they move out of the area and until at least an additional 30 minutes have passed without a listed marine mammal or sea turtle sighting. Monitoring of the zone will continue for 30 minutes following completion of the seismic surveying.
3. Monitoring of the zones will be conducted by one qualified NMFS-approved observer. Observer qualifications will include direct field experience on a marine mammal/sea turtle observation vessel and/or aerial surveys in the Atlantic Ocean. All observers will receive NMFS-approved marine mammal observer training and be approved in advance by NMFS after a review of their qualifications. Visual observations will be made using binoculars or other suitable equipment during daylight hours. Data on all observations will be recorded based on standard marine mammal observer collection data. This will include: dates and locations of construction operations; time of observation, location and weather; details of marine mammal sightings (e.g., species, numbers, and behavior); and details of any observed taking (behavioral disturbances or injury/mortality). Any significant observations concerning impacts on listed marine mammals or sea turtles will be transmitted to NMFS and MMS within 48 hours. Any observed takes of listed marine mammals or sea turtles resulting in injury or mortality will be immediately reported to NMFS and MMS.
4. Implementation of Ramp-Up: A “ramp-up” (if allowable depending on specific sound source) will be required at the beginning of each seismic survey in order to allow marine mammals and sea turtles to vacate the area prior to the commencement of activities. Seismic surveys may not commence (i.e., ramp up) at night time or when the exclusion zone cannot be effectively monitored (i.e., reduced visibility).

5. **Shut Down:** Continuous (day and night) seismic survey operations will be allowed. However, if a listed marine mammal or sea turtle is spotted within or transiting towards the exclusion zone surrounding the sub-bottom profiler and the survey vessel, an immediate shutdown of the equipment will be required. Subsequent restart of the profiler will only be allowed following clearance of the exclusion zone and the implementation of ramp up procedures (if applicable).
6. **Compliance with Equipment Noise Standards:** All seismic surveying equipment will comply as much as possible with applicable equipment noise standards of the USEPA, and all equipment will have noise control devices no less effective than those provided on the original equipment.
7. **Reporting for Seismic Surveys Activities:** The following reports must be submitted during the conduct of seismic surveys:
 - a. A report will be provided to USACE, MMS and NMFS within 90 days of the commencement of seismic survey activities that includes a summary of the seismic surveying and monitoring activities and an estimate of the number of listed marine mammals and sea turtles that may have been taken as a result of seismic survey activities. The report will include information, such as: dates and locations of operations, details of listed marine mammal or sea turtle sightings (dates, times, locations, activities, associated seismic activities), and estimates of the amount and nature of listed marine mammal or sea turtle takings.
 - b. Any observed injury or mortality to a listed marine mammal or sea turtle must be reported to USACE, NMFS and MMS within 24 hours of observation. Any significant observations concerning impacts on listed marine mammals or sea turtles will be transmitted to USACE, NMFS and MMS within 48 hours.

A.3 Reduction or Elimination of the Potential for Adverse Impact Activities on Protected Species from Construction Stipulation

1. **Pre-Construction Briefing:** Prior to the start of construction, a briefing will be held between the construction supervisors and crews, the marine mammal and sea turtle visual observer(s), and lessees. The purpose of the briefing will be to establish responsibilities of each party, define the chains of command, discuss communication procedures, provide an overview of monitoring purposes, and review operational procedures. The Resident Engineer will have the authority to stop or delay any construction activity, if deemed necessary. New personnel will be briefed as they join the work in progress.
2. **Requirements for Pile Driving:** The following measures will be implemented during the conduct of pile driving activities related to meteorological towers:
 - a. **Establishment of Exclusion Zone:** A preliminary 1,000 meter (3,280 feet) radius exclusion zone for listed marine mammals and sea turtles will be established around each pile-driving site in order to reduce the potential for serious injury or mortality of these species. Once pile driving begins, the actual generated sound levels will be measured (see requirements in (b) below for Field Verification of Exclusion Zone) and a new exclusion zone will be established based on the results of these field-verified measurements. This new exclusion zone will be established based on data collected in the field and used to calculate the actual distance from the pile driving source where underwater sound levels are anticipated to equal 160 dB re 1 microPa root-mean-square (rms) (impulse). Based on the outcome of the field-verified sound levels and the calculated or measured distances as noted above, the applicant can either: (1) retain the 1,000 meter (3,280 feet) zone or (2) establish a new zone based on field-verified measurements demonstrating the distance from the pile driving source where underwater sound pressure levels (SPLs) are anticipated to equal the received the 160 dB re 1 μ Pa rms (impulse). Any new exclusion zone radius must be based on the most conservative measurement (i.e., the largest safety zone configuration).

- b. Field Verification of Exclusion Zone: Field verification of the exclusion zone will take place during the first three pile strikes following completion of the ramp up. The results of the measurements from the first three pile after ramp up can then be used to establish a new exclusion zone which is greater than or less than the 1,000 meters (3,280 feet) depending on the results of the field tests.
- c. Visual Monitoring of Exclusion Zone: Visual monitoring of the exclusion zone will be conducted during driving of all piles. To ensure proper monitoring of the exclusion zone around the entire pile, the protected species observers shall be either on the vessel that is driving the pile or on a vessel that is in close proximity to the pile driving. Should the Lessee decide to use multiple observing locations (e.g., several boats), those locations should be spaced in a manner that ensures observation coverage of the entire exclusion zone. Monitoring of the exclusion zones will be conducted by qualified NMFS approved observers. Observer qualifications will include direct field experience on a marine mammal/sea turtle observation vessel and/or aerial surveys in the Atlantic Ocean/Gulf of Mexico. All observers must be approved in advance by NMFS after a review of their qualifications. Multiple monitors will be required if pile driving is occurring at multiple locations at the same time.
- d. Initiation and Duration of Observation: Observer(s) will begin monitoring at least 30 minutes prior to soft start of the pile driving. Pile driving will not begin until the zone is clear of all listed marine mammals and sea turtles for at least 30 minutes. Monitoring will continue through the pile driving period and end approximately 30 minutes after pile driving is completed.
- e. Recording Observations: Visual observations will be made using binoculars or other suitable equipment during daylight hours. Data on all observations will be recorded based on standard marine mammal observer collection data. This will include: dates and locations of construction operations; time of observation, location and weather; details of marine mammal sightings (e.g., species, numbers, age class (if known), behavior); and details of any observed taking (i.e., behavioral disturbances, injury, and mortality). Any observed significant behavioral reactions (e.g., fleeing the area) or injury or mortality to any marine mammals or sea turtles must be transmitted to NMFS and MMS within 48 hours. Any observed takes of listed marine mammals or sea turtles resulting in injury or mortality will be immediately reported to NMFS, USFWS and MMS.
- f. Required Mitigation, Should Listed Marine Mammals or Sea Turtles Enter the Exclusion Zone: The exclusion zone around the pile-driving activity must be monitored for the presence of listed marine mammals or sea turtles before, during and after any pile driving activity. The exclusion zone will be monitored for 30 minutes prior to the soft start of pile driving. If the safety radius is obscured by fog or poor lighting conditions, pile driving will not be initiated until the entire safety radius is visible for the 30-minute period. If listed marine mammals or sea turtles are observed within the zone during the 30-minute period and before the soft start begins, pile driving of the segment will be delayed until they move out of the area and until at least an additional 30 minutes have passed without a listed marine mammal or sea turtle sighting. Monitoring of the zone will continue for 30 minutes following completion of the pile-driving activity.
- g. Required Mitigation, Should Listed Marine Mammals or Sea Turtles Enter the Exclusion Zone After Pile Driving Begins: If listed marine mammals or sea turtles enter the exclusion zone after pile driving of a segment has begun, pile driving will cease until the listed marine mammal or sea turtle leaves the exclusion zone. Observers will monitor and record listed marine mammal and sea turtle numbers and behavior. Pile driving may not resume until at least 30 minutes have passed without a listed marine mammal or sea turtle sighting within the exclusion zone. If pile driving of a segment ceases for 30 minutes or more and a listed marine mammal or sea turtle is sighted within the designated

- zone prior to commencement of pile driving, the observer(s) must notify the Resident Engineer (or other authorized individual) that an additional 30-minute visual and acoustic observation period will be completed by the Lessee, as described above, before resuming pile-driving activities.
- h. Dark or Inclement Weather Conditions: In addition, pile driving may not be started during night hours or when the safety radius can not be adequately monitored (e.g., obscured by fog, inclement weather, poor lighting conditions) unless the applicant implements an alternative monitoring method that is agreed to by MMS and NMFS. However, if a soft start has been initiated before dark or the onset of inclement weather, the pile driving of that segment may continue through these periods. Once that pile has been driven, the pile driving of the next segment cannot begin until the exclusion zone can be visually or otherwise monitored.
 - i. Implementation of Soft Start: A “soft start” will be required at the beginning of each pile installation in order to provide additional protection to listed marine mammals and sea turtles near the project area by allowing them to vacate the area prior to the commencement of pile driving activities. The soft start requires an initial set of three strikes from the impact hammer at 40-percent energy with a one minute waiting period between subsequent three-strike sets. If listed marine mammals or sea turtles are sighted within the exclusion zone prior to pile-driving, or during the soft start, the Resident Engineer (or other authorized individual) will delay pile-driving until the animal has moved outside the exclusion zone.
 - j. Compliance with Equipment Noise Standards: All construction equipment will comply as much as possible with applicable equipment noise standards of the USEPA, and all construction equipment will have noise control devices no less effective than those provided on the original equipment.
3. Reporting for Construction Activities: The following reports must be submitted during construction:
- a. Field Verification Measurements: After any re-establishment of the exclusion zone, a report must be provided to MMS and NMFS detailing the field verification measurements within seven days. This includes information, such as: a fuller account of the levels, durations, and spectral characteristics of the impact and vibratory pile driving sounds; and the peak, rms, and energy levels of the sound pulses and their durations as a function of distance, water depth, and tidal cycle. Any new zone may not be implemented until MMS and NMFS have reviewed and approved any changes.
 - b. Weekly Reports: Weekly status reports will be provided to MMS and NMFS that include a summary of the previous week’s monitoring activities and an estimate of the number of listed marine mammals and sea turtles that may have been taken as a result of pile driving activities. These reports will include information, such as: dates and locations of construction operations, details of listed marine mammal or sea turtle sightings (e.g., dates, times, locations, activities, associated construction activities), and estimates of the amount and nature of listed marine mammal or sea turtle takings. The NMFS and MMS may reduce or increase the frequency of this reporting throughout the time period of pile driving activities dependent upon the outcome of these initial weekly reports.
 - c. Observed Injuries or Mortalities: Any observed injury or mortality to a listed marine mammal or sea turtle must be reported to NMFS or USFWS and MMS within 24 hours of observation.
 - d. Final Technical Report: A final technical report within 120 days after completion of the pile driving and construction activities will be provided by lessee to the MMS, NMFS, and USFWS that provides full documentation of methods and monitoring protocols, summarizes the data recorded during monitoring, estimates the number of listed marine

mammals and sea turtles that may have been taken during construction activities, and provides an interpretation of the results and effectiveness of all monitoring tasks.

A.4 Reduction or Elimination of the Potential for Adverse Impacts from Pile Driving Stipulation

The lessee shall implement the following specific measures to reduce or eliminate the potential for adverse impacts from pile driving.

1. Use a vibratory hammer when driving piles. Under those conditions where impact hammers are required for reasons of seismic stability or substrate type, it is recommended that the pile be driven as deep as possible with a vibratory hammer prior to the use of the impact hammer.
2. Monitor peak sound pressure levels (SPLs) during pile driving to ensure that they do not exceed the 160 dB re: 1 μ Pa.
3. Implement measures to attenuate the sound should SPLs exceed the 160 dB re: 1 μ Pa threshold. If sound pressure levels exceed acceptable limits, implement mitigation measures. Methods to reduce the sound pressure levels include, but are not limited to, the following:
 - a. Surround the pile with an air bubble curtain system or air-filled coffer dam.
 - b. Since the sound produced has a direct relationship to the force used to drive the pile, use of a smaller hammer should be used to reduce the sound pressures.
 - c. Use a hydraulic hammer if impact driving cannot be avoided. The force of the hammer blow can be controlled with hydraulic hammers; reducing the impact force will reduce the intensity of the resulting sound.
4. Implementation of a “soft start” will be required at the beginning of each pile installation allowing marine mammals, sea turtles and fish to leave the area before noise levels reach their maximums. The soft start requires an initial set of three strikes from the impact hammer at 40-percent energy with a one-minute waiting period between subsequent three-strike sets.

A.5 Vessel Strike Avoidance Stipulation

The lessee shall implement the following specific measures meant to reduce the potential for vessel harassments or collisions with ESA-listed marine mammals or sea turtles during all phases of the project.

1. All vessels and aircraft associated with the construction, operation/maintenance and/or decommissioning of the project will be required to abide by the: (1) NOAA Fisheries Northeast Regional Viewing Guidelines, as updated through the life of the project (http://www.nmfs.noaa.gov/pr/pdfs/education/viewing_northeast.pdf); and (2) MMS Gulf of Mexico Region’s NTL No. 2007-G04 (<http://www.gomr.mms.gov/homepg/regulate/regs/ntls/2007NTLs/07-g04.pdf>), or any superseding NTL.
2. All vessel and aircraft operators must undergo training to ensure they are familiar with the guidance in #1 above. These training requirements must be written into any contractor agreements.
3. Upon receipt of a permit, all companies will instruct all personnel associated with the project construction and operation of the potential presence of the manatees and the need to avoid collisions with manatees.
4. All personnel and contractors will be advised that there are civil and criminal penalties for harming, harassing, or killing marine mammals and sea turtles, which are protected under MMPA and ESA. The company may be held responsible for any manatee harmed, harassed, or killed as a result of port activity.
5. All vessels associated with the project will operate at idle speed at all times while in shallow waters where the draft of the vessel provides less than a four foot clearance from the bottom.
6. If manatees are sighting within 100 yards of the project, all appropriate precautions shall be implemented to ensure protection of the manatees. These precautions shall include operating all

equipment in such a manner that moving equipment does not come any closer than 50 feet of any manatee. Any collision with any manatee must be reported immediately to the USFWS at 904-731-3103.

7. Any collision with any other marine mammal must be reported. More information can be found at <http://www.nmfs.noaa.gov/pr/shipstrike/msr/>.
 - a. Vessels transiting MSR areas are required to report their course, speed, position, destination, and route to the U.S. Coast Guard upon entry into the reporting area. Vessels should report via INMARSAT C to one of the following addresses: Email: RightWhale.MSR@noaa.gov or Telex: 236737831
 - b. Vessels not equipped with INMARSAT C should report via alternate satellite communications equipment to one of the following addresses: Email: RightWhale.MSR@noaa.gov or Telex: 236737831. Vessels unable to use satellite communications equipment should contact the U.S. Coast Guard Communication Area Master Station, Chesapeake, Virginia via SITOR/NBDP on 8426.3 kHz, 12590.8 kHz, 16817.8 kHz twenty four hours per day, or 6314.3 kHz from 2300 GMT until 1100 GMT and 22387.8 kHz from 1100 GMT until 2300 GMT.
 - c. Vessels unable to use satellite communications or SITOR/NBDP should contact the U.S. Coast Guard Communication Area Master Station, Chesapeake, Virginia via published voice frequencies.
 - d. Mariners can learn more about steps to avoid collisions with whales at: http://www.nmfs.noaa.gov/pr/pdfs/shipstrike/marinersweatherlog_shipstrike.pdf.
8. The lessee will maintain a log detailing manatee sightings, collisions, or injuries should they occur during operations. Following project completion a report summarizing incidents and sightings must be submitted to USFWS.

A.6 Marine Trash and Debris Awareness and Elimination Stipulation

All vessel operators, employees and contractors actively engaged in offshore operations must be briefed on marine trash and debris awareness and elimination. The lessee will be required to ensure that its employees and contractors are made aware of the environmental and socioeconomic impacts associated with marine trash and debris and their responsibilities for ensuring that trash and debris are not intentionally or accidentally discharged into the marine environment.

A.7 Reduction or Elimination of the Potential for Adverse Impacts to Birds and Bats Stipulation

The lessee shall implement the following specific measures to reduce or eliminate the potential for adverse impacts birds and bats.

1. Anti-Perching Devices: Lessees would be required to use anti-perching material and/or devices in areas where they are likely to be effective (e.g., horizontal surfaces, diagonal bars).
2. Restricted Use of Guy Wires: Meteorological towers should be designed so as to preclude the necessity for guy wires.
3. Lighting: Lights will be installed in compliance with FAA guidelines and USCG navigational safety lighting requirements. The lessee shall leave any additional lights (e.g., work lights) on only when necessary and downshield when possible, to reduce upward illumination and illumination of adjacent waters. Downshielding would involve "hooding" the lamps such that the light is shielded to minimize visibility from above. These requirements apply to lighting on the meteorological tower as well as all support vessels.

A.8 Archeological Resources Stipulation

The purpose of this stipulation is to establish the process for determining if archaeological resources are present, and the measures the lessee must take to avoid disturbing those resources. This stipulation also describes the procedures if an unanticipated archaeological resource is discovered while conducting any activity related to a project.

As part of preparing the Project Plan, the lessee will be required to conduct an archaeological resource survey. Survey line spacing for the proposed lease areas shall be conducted at no greater than 30-meter line spacing.

If the MMS review of lessee's archaeological report concludes that an archaeological resource may be present, the MMS will specify a minimum distance by which all proposed seafloor-disturbing activities must avoid the potential archaeological resource, unless the lessee can demonstrate through further investigations that an archaeological resource either does not exist or will not be adversely affected by the proposed seafloor-disturbing activities.

If the lessee chooses to conduct further archaeological investigations, rather than avoid the potential resource, the MMS will specify the appropriate personnel, equipment, and techniques to be used. The report of additional investigations must be submitted to the MMS for review. The MMS will notify the lessee if it is determined that an archaeological resource exists and may be adversely affected by the proposed seafloor disturbing activities. The lessee (and all subcontractors or agents acting on behalf of the lessee) will keep the location of the discovery confidential and not take any action that may adversely affect the archaeological resource until MMS makes an evaluation and tells the lessee how to proceed.

If the lessee, the lessee's subcontractors, or any agent acting on the behalf of the lessee, discover a potential archaeological resource while conducting surveys, construction activities, or any other activity related to the lessee's project; all must:

1. Immediately halt all seafloor-disturbing activities within the area of the discovery;
2. Notify the MMS Director of the discovery within 72 hours; and,
3. Keep the location of the discovery confidential and must not take any action that may adversely affect the archaeological resource until MMS has made an evaluation and told the lessee how to proceed.

The MMS may require the lessee to conduct additional investigations to determine if the resource is eligible for listing on the National Register of Historic Places under 36 CFR 60.4 if the site has been impacted by the lessee's project activities or if impacts to the site or to the area of potential effect cannot be avoided. If further investigations indicate that the resource is potentially eligible for the National Register of Historic Places, the MMS will tell the lessee how to protect the resource, or how to mitigate adverse effects to the site. Section 110(g) of the National Historic Preservation Act authorizes the MMS to charge licensees and permittees reasonable costs for carrying out preservation responsibilities under the OCS Lands Act (OCSLA).

A.9 Notification of Fishermen Stipulation

The lessee shall put a notice in the USCG Local Notice to Mariners, a free publication available to all fishermen, regarding the timeframe and location of construction and decommissioning activities in advance of mobilization. The lessee shall also send daily broadcasts on Marine Channel 16 as to the construction and decommissioning activities for the day the broadcast is aired and for upcoming days.

A.10 Site Clearance Stipulation

The lessee shall provide objective evidence that the area used for data collecting facilities and structures is returned to its original state after decommissioning and removal from the site. Any trash or bottom debris introduced as a result of the lessee's operations is expected to be removed. Objective evidence would normally consist of a photographic bottom survey, site-clearance trawling, or high-resolution sidescan or sector-scanning sonar survey.

APPENDIX B PHYSICAL AND ENVIRONMENTAL SETTINGS

The seven proposed lease areas are located 8-17 miles offshore of Delaware Bay and New Jersey's southern Atlantic coast in water depths of 40-110 feet (12-34 meters) (see Figure 1-1).

B.1 Geology

Chapter 4.2.1 of the Programmatic EIS discusses in detail the geology of the entire Atlantic region, while the following section describes the geologic setting of the offshore Delaware and New Jersey region associated with the proposed project lease block areas.

The offshore Delaware and New Jersey region is located within the Atlantic Continental Margin, which consists of the continental shelf, slope, and rise. The Atlantic Continental Shelf is the submarine extension of the coastal plain deposits from the shoreline to approximately 200 meters of water depth. The shelf is characterized by a very gentle slope of approximately 0.1°. From the Delaware coast, the continental shelf extends for approximately 129 kilometers (80 miles) and gradually widens to approximately 190 kilometers (118 miles) off the New Jersey coast. The termination of the shelf occurs at the shelf edge, where an abrupt change in slope (shelf break) demarcates the beginning of the continental slope. In the offshore Delaware–New Jersey region, the shelf break occurs at a depth of approximately 120 to 160 meters (394 to 525 feet) (Uchupi, 1968).

The morphology and shallow geology of the continental shelf off the Delaware and New Jersey coastline are heavily influenced by the combination of (1) Pleistocene sea level fluctuations and glacial, fluvial, and estuarine processes; and (2) post-Pleistocene events that modified Pleistocene sedimentation patterns along the shallow continental shelf (Schlee, 1973). Relict Pleistocene erosional and depositional features are common along this region of the OCS including Pleistocene shorelines and terraces, submarine channels, submarine canyons, shoal retreat massifs, and deltaic structures (Emery and Uchupi, 1972; USDOJ, MMS, 1999). Post-Pleistocene features include reworked relict features, such as infilled paleoriver channels as well as the formation of new features such as river channels, sand waves, and sand ridges or shoals (Emery and Uchupi, 1972). Regional sediment sources that contribute to the bottom sediments include (1) Tertiary and Cretaceous strata underlying the shelf and adjacent Atlantic Coastal Plain, (2) glacio-fluvial deposits, and (3) present-day river sediment (Ross, 1967; Schlee, 1973).

Submarine shallowly-buried fluvial channel systems and deltaic structures formed during the last low stand of sea level when rivers, carrying glacial meltwater and outwash gravels and sands, flowed across the present-day shelf to the shelf edge carving stream valley features and depositing shoreline sediment complexes. These paleochannels, several kilometers in width, later infilled with tens of meters sediments as the marine transgression of the coastline caused the rivers to recede across the shelf and the Pleistocene patterns of sedimentation were reworked and buried (Emery and Uchupi, 1972; Duane and Stubblefield, 1988; Swift et al., 1972, 1980; Schlee, 1973).

The major cross-shelf topographic channels that traverse the Delaware-New Jersey OCS include, from South to North, the Delaware Valley, the Great Egg Valley, and the Hudson Valley. All of the proposed Delaware-New Jersey sites are bounded by the Delaware Valley to the South and the Hudson Valley to the North. The modern-day Delaware and Hudson River channels superimpose these two paleochannels. The proposed site within Block 6325 is located immediately north of the Delaware River channel within shallow waters of approximately of 12 to 20 meter deep. Two of the proposed Blocks, 6931 and 7033, are within the Great Egg Valley paleochannel. Block 6931 is located within a broad area of relatively featureless topographic relief in approximately 18 to 20 meter water depth that is an area of probable constructional origin as either a shoal retreat massif or stand-still delta (Swift et al., 1972). Shoal retreat massifs are estuary mouth deposits left on the shelf as sea level rose and the estuary positions retreated landward (Duane and Stubblefield, 1988; Swift et al., 1972). Since the shoal retreat massif is superimposed on the Great Egg Valley paleochannel, it is likely that the channel completely filled with estuarine sediments as the retreat path of the estuary followed the former subarial river valley. Block 7033 is also located within the shoal retreat massif of the Great Egg Valley paleochannel in

approximately 24 to 30 meter water depth. In contrast to Block 6931, the area within Block 7033 exhibits sand ridge bedform morphology.

The most prominent constituent of seabed morphology along the Delaware-New Jersey shelf are sand ridges (or shoals) (Goff et al., 2005; Swift et al., 1972). Sand ridges are approximately 1 to 12 meter in height and approximately 2 to 20 kilometers in length with a spacing of approximately 1 to 5 kilometers apart (Goff et al., 2005). Nearshore, sand ridges are shoreface-attached bedforms that form a ridge-and-swale topography that has an oblique orientation to the coastline of 10° to 60° toward the dominant along-shore current direction (Goff et al., 2005). From south to north, the proposed Blocks 7131 (~18 to 26 meter water depths), Block 6936 (~22 to 31 meter water depths), and 6738 (~24 to 28 meter water depths), and Block 6451 (~27 to 33 meter water depths) are all located within this ridge-and-swale shelf environment.

General mapping of the continental shelf indicates that surficial sediments of the Delaware and New Jersey are dominated by detrital sand with varying mixtures of silt and gravel (USDOI, MMS, 1999). Lease blocks located within the ridge-and-swale topography consist of sand ridges that range in grain sizes from sandy mud to mud-depleted gravelly sand (Smith, 1996; USDOI, MMS 1999). These units overlie a regional unconformity of Pleistocene sands that may be exposed in the swales due to erosion. Swale floors may consist of very coarse sand, gravel, and pebble sediments (USDOI, MMS, 1999). Some ribbon-floored swales consist of shell hash with occasional areas of gravel and rounded cobbles. Other ribbon morphology swales are very poorly sorted with significant percentages of mud and coarse particles in addition to medium sands (Goff et al., 2005; USDOI, MMS, 1999).

B.2 Physical Oceanography

Chapter 4.2.3 of the Programmatic EIS discusses in detail the physical oceanography of the entire Atlantic Ocean, which includes waves, ocean currents, and tides. The following section describes the physical oceanography of the offshore Delaware and New Jersey region associated with the proposed project lease block areas.

Sea states follow annual weather patterns, with the roughest conditions occurring September through March (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004). Data collected from National Data Buoy Center buoys located offshore of Delaware Bay (Buoys 44009 and 44012) and Raritan Bay (Buoy 44025) recorded monthly averages of significant wave height range from less than one meter in July to about 1.5 meters in December and January. These three stations recorded maximum wave heights of about 3 meters in July and 7.5 to 9.5 meters in December and January (USDOC, NOAA, National Data Buoy Center, 2009a-2009c).

Ocean currents are an important consideration in the design and siting of the proposed meteorological towers, because they drive sediment transport and foundation scouring. The primary component to currents in the proposed action area is wind generated near-surface currents (Atlantic Renewable Energy Corporation and AWS Scientific, Inc., 2004).

B.3 Meteorological Conditions

The seven proposed lease blocks are located over nearly 1° of latitude, approximately between latitudes of 38.7° N and 39.6° N. However, data collected from National Data Buoy Center buoys located offshore of Delaware Bay (Buoys 44009 and 44012) and Raritan Bay (Buoy 44025) show little variation between areas offshore of Delaware and New Jersey. Wind speed is typically lowest in July at 10 knots (12 mph) and highest in January at 15 knots (17 mph). Peak winds of up to 48 knots (55 mph) have been recorded at Buoy 44099 over the period of record (1984-present). The highest winds are associated with tropical cyclones, but more often high wind events are associated with extratropical cyclones in the winter season. Air temperature is typically highest in July at 23 ° C (73° F) and lowest in February at 3° C (37° F) (USDOC, NOAA, National Data Buoy Center, 2009a-2009c). Chapter 4.2.2.1 of the Programmatic EIS discusses the climatology of the entire Atlantic Region.



The Department of the Interior Mission

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.



The Minerals Management Service Mission

As a bureau of the Department of the Interior, the Minerals Management Service's (MMS) primary responsibilities are to manage the mineral resources located on the Nation's Outer Continental Shelf (OCS), collect revenue from the Federal OCS and onshore Federal and Indian lands, and distribute those revenues.

Moreover, in working to meet its responsibilities, the **Offshore Minerals Management Program** administers the OCS competitive leasing program and oversees the safe and environmentally sound exploration and production of our Nation's offshore natural gas, oil and other mineral resources. The **MMS Minerals Revenue Management** meets its responsibilities by ensuring the efficient, timely and accurate collection and disbursement of revenue from mineral leasing and production due to Indian tribes and allottees, States and the U.S. Treasury.

The MMS strives to fulfill its responsibilities through the general guiding principles of: (1) being responsive to the public's concerns and interests by maintaining a dialogue with all potentially affected parties and (2) carrying out its programs with an emphasis on working to enhance the quality of life for all Americans by lending MMS assistance and expertise to economic development and environmental protection.